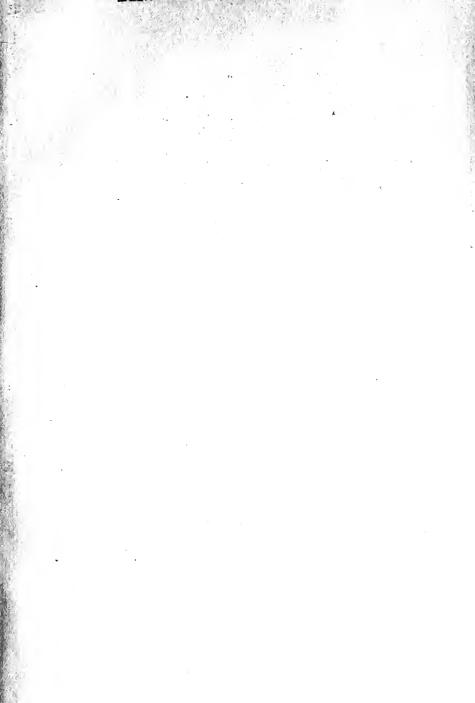
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THE ROCKEFELLER FOUNDATION Annual Report for 1920

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The Rockefeller Foundation

Annual Report

1920

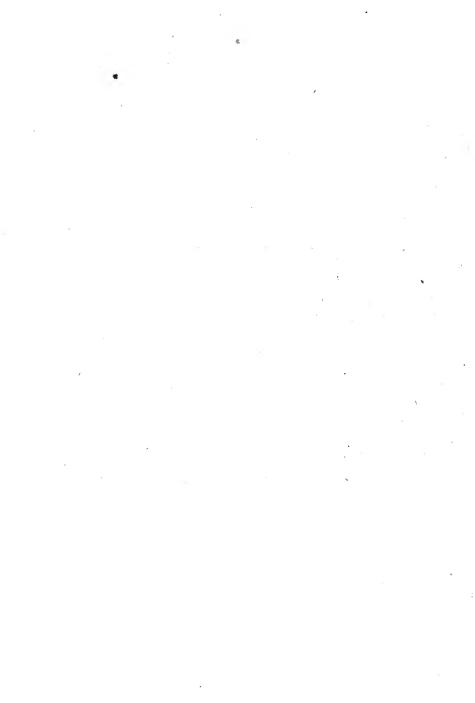
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The Rockefeller Foundation 61 Broadway, New York HV 97 R6F3

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THE ROCKEFELLER FOUNDATION OFFICERS, MEMBERS, AND COMMITTEES 1920

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> Director of Information Service CHARLES C. WILLIAMSON

^{*}Died April 4, 1921. **Resigned February 28, 1921.



THE ROCKEFELLER FOUNDATION

President's Review

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To the Members of the Rockefeller Foundation: Gentlemen:

I have the honor to transmit herewith a general review of the work of the Rockefeller Foundation for the period January 1, 1920, to December 31, 1920, together with the detailed reports of the Secretary and the Treasurer of the Foundation, the General Director of the International Health Board, the General Director of the China Medical Board, and the Director of the Division of Medical Education.

Respectfully yours,
GEORGE E. VINCENT,
President.

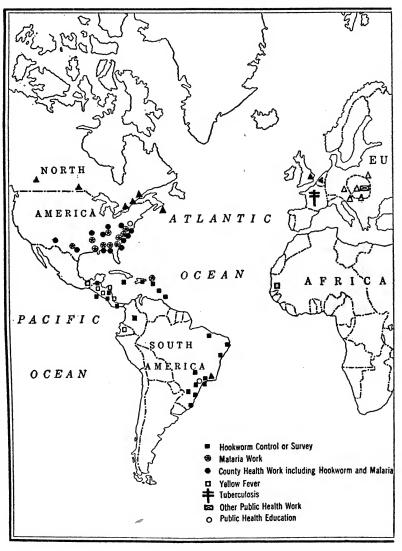
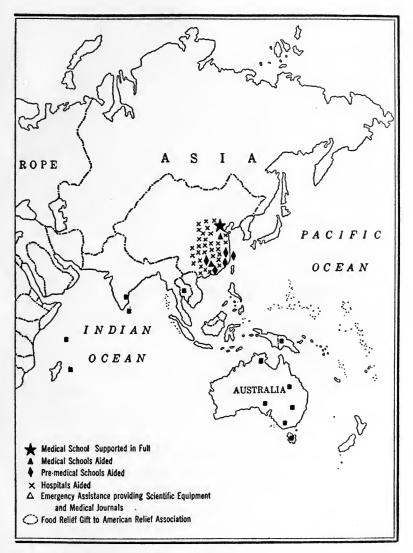
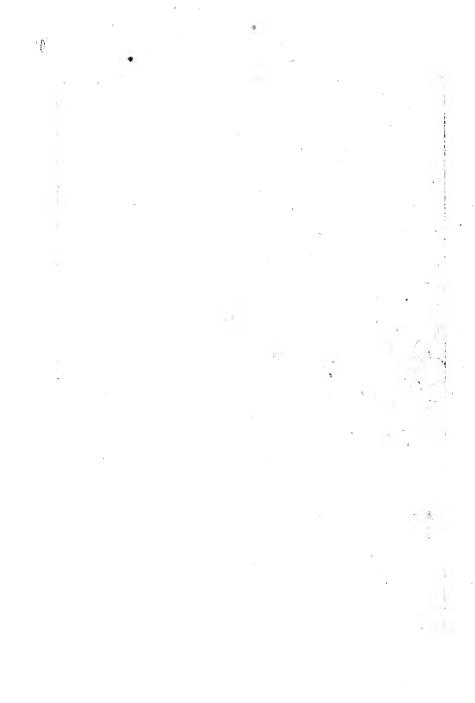


Fig. 1.—World map of activities of



Rockefeller Foundation during 1920



PRESIDENT'S REVIEW

The Year in Brief

During the year 1920 the Rockefeller Foundation (1) aided six medical schools in Canada, (2) gave a large sum to a medical training center in London, (3) appropriated a million francs for the Oueen Elisabeth Foundation for Medical Research in Belgium, (4) agreed to contribute toward the complete rebuilding of the medical school of the University of Brussels, (5) provided American and English medical journals or laboratory supplies for eleven medical schools and medical libraries in five European countries, (6) continued to construct and to maintain in Peking, China, a modern medical school with a pre-medical department, (7) aided thirty-one hospitals in China to increase their efficiency in the care of patients and in the further training of doctors and nurses, (8) supported the School of Hygiene and Public Health of the Johns Hopkins University, (9) contributed to the teaching of hygiene in the medical school at São Paulo, Brazil, (10) provided fellowships in public health and medical education for ninety individuals who represented thirteen different countries, (11) brought to the United States commissions of medical teachers and hygienists from England, Belgium, and

Czechoslovakia, (12) continued to support a campaign against yellow fever in South and Central America and in West Africa, (13) aided government agencies in the control of malaria in ten states of the South, (14) prosecuted hookworm work in nine southern states and in eighteen foreign countries, (15) helped to expand antihookworm campaigns into more general health organizations in counties, states, and nations, (16) brought a war-time anti-tuberculosis work in France to the point where it could soon be left entirely in French hands, (17) assisted the government of Czechoslovakia to reorganize its public health laboratory system, (18) rendered various services in organizing committees to study the training of nurses and of hospital superintendents, lent experts for conference and counsel, sent officers abroad to study conditions, etc., (19) brought to a close its participation in war-time emergency relief by giving a million dollars to the fund for European children. These things were done in part by the Foundation but chiefly through its departmental agencies—the International Health Board, the China Medical Board, and the Division of Medical Education.

From Cure to Prevention

A railway spends more money on train and track inspection than on wreck crews. The

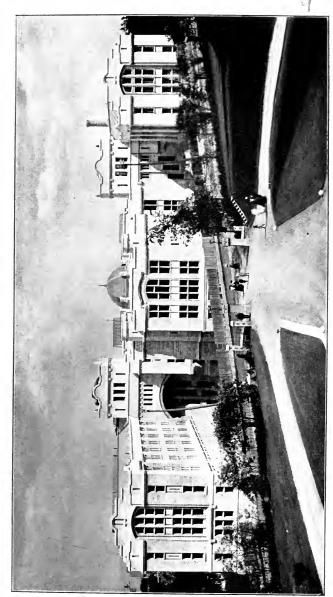


Fig. 2.—New medical school building of McGill University, Montreal

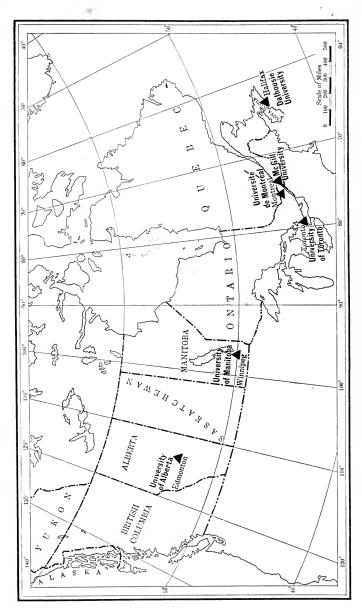


Fig. 3.—Medical schools of Canada receiving Foundation aid

average automobile owner is on the watch for signs of motor trouble and does not wait until there is a breakdown. The factory manager looks solicitously after his machines and does all he can to guard against interruptions in production. The human body, which is vastly more complex than any machine, is in need of vigilant care and frequent examination. Yet for the most part it is neglected until pain and disability sound an unmistakable alarm. Then the doctor is called in and too often is expected to do the impossible. He is thought of as a wreck crew rather than as a train and track inspector.

It is often said that if all available knowledge about the causes of disease were actually applied the world over, millions of lives could be saved every year. This statement is true, but it may easily mislead. One is likely to infer that enough public health officers and sanitary engineers could usher in a hygienic millennium. But the thing is by no means so simple. The public authorities at best can control wholly or in part only about 20 per cent of the diseases by which people are crippled or killed. Typhoid, scarlet fever, smallpox, and malaria can be either entirely prevented or kept from spreading; but tuberculosis, measles, diphtheria, pneumonia, influenza, and many other maladies are either less perfectly understood or do not respond so readily to control efforts.

Valuable as this community protection against contagious diseases is, it must be remembered that about 80 per cent of the menace to life is not dealt with, at any rate directly, by public authori-The idea of prevention, then, will have limited influence until it is accepted not merely as a government policy but as a guiding principle in individual lives. Education of whole communities and nations, changes in habits of thought, a new attitude toward disease and toward medical service, are essential conditions of progress. So far from discarding the doctor, this new régime will give him a changed but no less indispensable task. He will increasingly be called upon to keep his patients well. The emphasis is shifting from cure to prevention. The consequences for the training of doctors are vital and fundamental.

Training the Modern Doctor

Early medical training was an apprenticeship. The prospective doctor was for a premium or fee taken as a pupil by a physician. The neophyte learned by spending his time with his master as he went the rounds of his patients, compounded drugs in his dispensary, and, it may be, walked the wards of a hospital. Gradually this system was superseded by the proprietary school in which a group of doctors in connection with a hospital offered a course of training of a more

systematic kind. Such schools were generally a source of revenue to the teachers. The expenses were slight and the tuition fees often reached a substantial total. The proprietary school has of late yielded to the endowed or state-supported medical school, which is usually connected with a university. Modern medical education can no longer be maintained on a commercial basis. It is an essential social task for which private or government aid must be provided.

The reasons for this change are not far to seek. The sciences which contribute to a knowledge of the human body and its processes, and the technical resources of treatment and prevention, have grown enormously and are steadily developing. Well-equipped laboratories in charge of highly trained persons, and elaborately organized hospitals with teaching and research facilities under the control of physicians who give all or a large part of their time to the care of patients, to instruction, and to investigation, are absolutely essential for a modern medical school of high rank. Even schools on lower levels must possess in equipment and staff a minimum which calls for substantial sums. To meet this demand for increased support, states have made large appropriations and privately supported universities have received generous gifts. The Rockefeller Foundation has decided that in no more fundamental way can it contribute to progress than by helping strategically placed medical schools in various parts of the world to increase their resources and to improve their teaching and research.

From Edmonton to Halifax

In connection with a gift made in December, 1919, Mr. Rockefeller expressed the hope that aid might be rendered to Canadian medical schools. A study was therefore promptly undertaken as a basis for making appropriations. Statistics were gathered, maps prepared, personal interviews held with representatives of all nine Canadian medical schools. In this way a fairly clear picture of the situation in the Dominion was obtained. One saw that the country fell into more or less distinct areas each of which has a certain self-contained unity: the Pacific Coast, the Western Provinces, Ontario, French Quebec, and the Maritime Provinces. Capitals for these regions have been established. Medically these capitals are Edmonton, Winnipeg, Toronto, Montreal-Quebec, and Halifax.

A comparison between the United States and Canada with respect to medical schools and doctors is of interest. The United States has a medical school for every million and a quarter of inhabitants; Canada, 1 for every 900,000. South of the boundary there is one medical student for

every 8,000 of population; north of the line the ratio is 1 to 3,700. When it comes to doctors, the situation is reversed. "The States" have 1 doctor to 720; the Dominion 1 to 1,050. This is to be accounted for largely by two things: emigration of Canadian doctors, and the very large output of American doctors during the era of the old proprietary schools. There is a wide variation in the ratio of doctors to population in the different parts of Canada. Thus in Ontario it is 1 to 800, in Nova Scotia 1 to 950, in Alberta 1 to 1,100, in New Brunswick 1 to 1,350, in Yukon 1 to 1,400, and in Newfoundland 1 to 2,500.

It is estimated that Canada needs each year 300 new doctors. Existing medical schools are easily able to provide this number. The obvious need is to increase the resources of the strategically placed schools. It is evident that the Dominion must find a way to distribute its physicians more widely and to bring preventive medicine, hospital care, and medical and nursing service within the reach of the too generally neglected rural population. Precisely the same thing is true in the United States.

Five Millions for the Dominion

The study once made, the facts seemed to indicate clearly the institutions to be aided. Each was asked to prepare its own plan of future growth.

Toward the realization of such plans the Rockefeller Foundation made contributions. Dalhousie University, Halifax, received half a million for its admirable scheme, which included the participation of the Provincial Government, the Halifax dispensary, a Salvation Army maternity hospital, the city of Halifax, and other agencies.

The distinguished medical school of McGill University, Montreal, was given a million for endowment in connection with a plan which called for more than an equal sum for new buildings and other improvements. Toronto University for its notable medical school was also voted a million toward a total to which the Provincial Government and friends of the University contributed. The University of Manitoba, Winnipeg, received a half million which was supplemented by government grants for both buildings and maintenance.

Two Canadian medical schools which are in process of reorganization were dealt with in a different way. The University of Alberta, which is expanding its course from a partial to a full curriculum, was voted \$25,000 for the academic year 1920-1921. The medical school of the newly organized University of Montreal was given an equal amount for its pre-medical courses. The former institution is a Provincial university which has close relations with an experiment in

rural hospitals and public health. The latter is a French-Catholic university which has recently succeeded in raising five millions for buildings and endowment.

In addition to the three millions already appropriated, the Foundation has set aside two millions for Canadian medical education. The interest on this sum, pending the distribution of the principal, will be devoted to annual subsidies, fellowships, and other forms of aid. It is perhaps worth noting that the Dominion appropriations are being paid in United States currency, which in terms of Canadian money adds about 10 per cent to the gifts.

"Walking the Hospitals" in London

This familiar phrase reflects the importance which the London medical schools attach to bed-side teaching. These schools show traces of the earlier régime of apprenticeship and of private organization. A group of physicians who form the staff of a hospital conduct bedside and dispensary instruction. The medical school, recognizing that laboratory training in anatomy, physiology, bacteriology, pathology, and other subjects is essential, appoints specialists who teach, for the most part in a specifically practical way, the sciences and arts which bear upon the care of the sick.

In course of time, mainly out of students' fees, these hospital schools have furnished themselves with teaching laboratories in the essential medical sciences, but they have not had the funds with which to provide for the laboratory sciences buildings, equipment, or staff on what may be called a university basis. The courses have been as a rule restricted to a somewhat narrow but thorough drilling in those phases of the subjects which are immediately applicable to the making of the practitioner. English students who desired a more fundamental and general laboratory training have usually resorted to the older universities, where physiology and chemistry, especially, have been developed by a succession of great teachers and investigators. Thus the English medical school does not typically combine both university and professional work to the same extent as is the case in Germany and to some degree in the best schools of the United States and Canada. There is reason to believe that this separation between university laboratory training and bedside teaching is detrimental to both.

It is true, however, that the British schools have developed a system by which the future practitioner is given a thorough practical training in the wards and in the dispensary. As a dresser and clinical clerk the English medical

student, under the close supervision of the staff, renders service to the patient, makes first-hand examinations, and assumes responsibility to an extent not equaled anywhere else in the world. This system is, so far as bedside teaching goes, the most significant contribution of British schools to the problem of training the doctor. It is an outgrowth of the apprenticeship idea at its best. The *clerkship* is, however, not the sole contribution of British medicine to modern medical education. Equally original and stimulating is the conception of individual laboratory training, which, beginning in physiology, has now spread to all the laboratory subjects.

In London as elsewhere there has been of late a demand for teachers whose chief, even sole, responsibility shall be for bedside instruction and research in the hospital. Although in every generation able English physicians have taught students and investigated disease with brilliant success, it has become increasingly clear that doctors who give themselves primarily to private and consulting practice cannot alone successfully meet the needs of students or the demands of research under modern conditions. The Royal Commission on University Education in London, reporting in 1913, strongly urged the introduction of clean-cut university standards and ideals into the clinical departments of the

London schools. This suggestion, together with other influences and considerations, led the British Government in January, 1920, to begin an experiment in the field of full-time clinical teaching. By grants of public funds units were established in four of the London schools. The unit consists of a salaried chief and two assistants in medicine or surgery who give their entire time to teaching and investigation in the hospital. The head of the unit was conceived as a university professor.

University College Hospital

The medical schools of London have, then, in the main, developed as professional schools for the training of practitioners, more or less cut off from the productive centers of medical science and from university control and influence. This is not to deny that many of these schools have enlisted the services of notable men, have made important contributions to medical knowledge, and have given an effective practical training. But at best these hospital schools, whose clinical teachers were generally prominent consultants, could not create the richer and more stimulating environment that has come to be essential in a university medical school.

The one partial exception to the London type is University College Hospital Medical School,



Fig. 4.—The University College Hospital, London

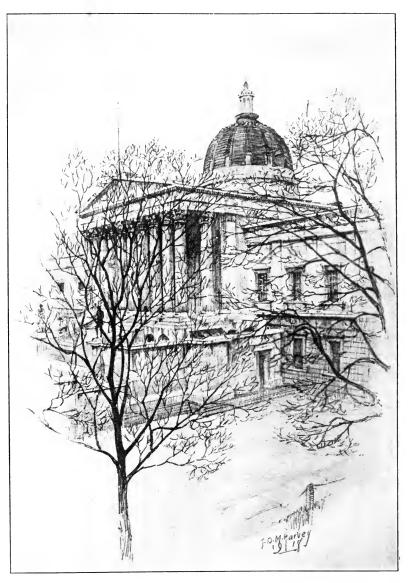


Fig. 5.—View of portico, University College, University of London. (From the drawing of a student of the school of architecture)

which, as originally established in 1828, was in form a unified university school, with a hospital built primarily for teaching purposes. The medical sciences—physiology, chemistry, and after a while even pharmacology—were developed within University College; the clinical staff, too, was created by University College, though in composition it did not essentially differ from that of the hospital schools.

In 1904, to meet requirements of the University of London, the school was separated into two faculties, and the hospital was put under an independent board. While this did not destroy the geographical unity of the laboratories and the hospital, the change did not make for that community of interest and that constant comradeship among laboratory scientists and bedside teachers which are now deemed so desirable.

In 1919 several causes combined to precipitate a new movement at University College and Hospital. The war had broken the "cake of custom"; a number of able and alert men in both faculties were eager to take a forward step; two units of full-time professors had been planned for the hospital; a scheme for expansion in both buildings and teaching staff was being discussed. Moreover, if something were not done, there was danger that important men would accept attractive appointments elsewhere. The posture

of affairs was almost critical. Should University College Hospital Medical School return to its original form as far as possible and consciously develop the possibilities inherent therein, seeking a real unity, or should it drift with the tide?

A Gift to British Medicine

At this juncture two representatives of the Rockefeller Foundation arrived in London on their way to the continent. Recognizing the possibilities of the University College and of the Hospital and Medical School, the Americans suggested that the Foundation might lend a hand. Tentative plans were worked out and provisional estimates were made. In February the trustees of the Foundation considered these preliminary proposals, expressed an interest in them, and invited the authorities of the College and of the Hospital and Medical School to send a joint committee to the United States. As a result of subsequent negotiations the trustees authorized in May the concluding of an agreement by which the Foundation promised to contribute about five million dollars toward the realization of the new plans of the University College groups.

This sum is almost equally divided between buildings and endowment for increased educational and research activities. The more important items in the building scheme are: an institute of anatomy, a lying-in pavilion for sixty patients, a home for nurses, a house for resident physicians, and the remodeling of the hospital to provide additional beds, clinical laboratories, and new operating suites. When the work is completed, this medical center will have an admirable modern plant and equipment, with a fully-controlled hospital of 500 beds and a large outpatient department. The new arrangement is by no means one-sided so far as the Rockefeller Foundation is concerned. The College and the Hospital authorities assume responsibility for increased expenses of maintenance which will call for substantial sums.

As a part of the understanding for the future the two separate bodies—the University College faculty and the Hospital staff—are each to be represented in the other by at least four professors. It is hoped that this formal inter-locking will be a symbol of the effective team-work between the university laboratory men and the bed-side teachers upon which the success of this unique London medical center will ultimately depend.

La Fondation Reine Elisabeth

As a matter of fact, the Foundation representatives who opened the negotiations in London were on their way to Belgium to learn what they could about medical education in that

country. When they reached Brussels, they found that Queen Elisabeth was planning to open a modest center for medical research in connection with a large new hospital which the municipality was building in the suburb of Jette near the out-of-town royal palace. The Queen has good reason to be interested in medicine. Her father was trained as a physician and she herself pursued medical courses as a part of her education. During the war she spent much of her time in the Belgian military hospitals and took a leading part in Red Cross work, especially in those activities which had to do with nursing and hospital service.

The Queen's idea is to provide under the directorship of the court physician, Dr. Pierre Nolf, a well-trained medical scientist, a center for research and advanced individual study to which a select number of the most promising graduates of the four Belgian medical schools may resort. A laboratory building is being modernly equipped in the midst of a hospital of more than 1,000 beds. Thus unusual opportunities will be provided for selecting and studying intensively various types of disease. The new institution has been named, in honor of its royal patroness, La Fondation Reine Elisabeth. Toward the endowment of this undertaking the Rockefeller Foundation, on the recommendation of its representatives, voted a million francs.

Unifying the Brussels Medical School

Of the four schools in Belgium, there seemed good reasons for believing that the Medical Department of the Free University of Brussels offered the most promising opportunity for significant and influential development. As in London, so in Brussels, new plans were being discussed. Dr. A. Depage, the eminent surgeon, had projected on a suburban site a hospital and nurses' training school which should be a memorial to Edith Cavell and to Madame Depage, who lost her life in the sinking of the Lusitania. There was dissatisfaction on the part of the bedside teachers with the antiquated municipal hospital of St. Pierre, in which the university instruction was given. The fact that the laboratories were more than two miles distant from the hospital was generally deplored. The annual budget, moreover, was wholly inadequate even on the modest salary level on which Belgian scientists do their work.

After a discussion of the entire situation it was agreed that the University, the City of Brussels, and Dr. Depage should draw up a plan which might be submitted to the Rockefeller Foundation with a view to securing its help. When the proposal was ready, it was decided that there would be an advantage in having this presented

in person by a delegation from Brussels. In the autumn of 1920 the Belgian party came to the United States as guests of the Foundation, visited a number of medical schools, and conferred with representatives of the Foundation with regard to the plan for unifying and rebuilding the Brussels medical plant and strengthening its work. Depage with fine magnanimity agreed to merge his plans in the one project. In December the Foundation indicated a willingness to give more than three million dollars provided the Brussels authorities could carry out the scheme. In February, 1921, complete agreements reached and the formal contracts were being prepared. It seems certain that Brussels will have a modern equipment which with the able men available will form the basis for notable progress in hospital administration, nurses' training, medical education, and research.

Medical Journals and Supplies for Europe

While the London, Brussels, and Canadian plans are characteristic of Foundation policy, other kinds of aid may in certain circumstances also be desirable. The post-war condition of medical schools in Eastern and Central Europe offered a case of emergency need. For example, in Vienna laboratory supplies such as glassware, rubber tubing, and chemicals were sadly lacking,

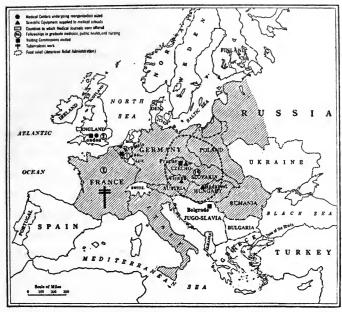


Fig. 6.—Aid undertaken in Europe by Rockefeller Foundation

and the university funds were wholly unequal to replenishing the storerooms. In English, French, and American journals and books there was a gap of five years, and at the rates of foreign exchange subscriptions could not be renewed.

Representatives were sent during 1920 to the chief medical centers in Jugoslavia, Czechoslovakia, Poland, Austria, and Hungary. Certain visits were also made to German university towns. On the recommendation of these Foundation agents appropriations for supplies were

made to six medical schools in Prague, Vienna, and Budapest, while promises to make good for a period the loss in exchange on medical journal subscriptions were given to institutions in these and other countries in Western, Central, and Eastern Europe.

With a view to assisting the authorities of the new University of Belgrade (Jugoslavia) to work out wisely their plans for a modern medical school, the university was invited to send a delegation of four to visit Western Europe, Great Britain, and the United States. The Foundation also expressed a willingness to consider fellowship aid for a carefully selected personnel.

East is West in Medicine

Before the war one could go by the Trans-Siberian Railway from Paris to Peking in a fortnight. The union of West and East seemed imminent. The Suez route is much longer, yet it
maintains not only commercial relations but a
steady interchange of ideas between Europe and
the Far East. The journey from New York to
the Chinese capital may be made in three weeks.
Western influences are streaming in growing
volume and force across the Pacific. In these
circumstances modern science and its applications are being rapidly extended. This is true of
the medical sciences, of the healing art, of hospi-

tal care, and in some degree of preventive medicine and research. In Tokio, Mukden, Manila, Hong Kong, Tsinan-fu, Shanghai, Changsha, and other centers modern medical training has been established. Throughout the Orient hospitals are approximating in varying degrees the standards of the West.

In Peking the Rockefeller Foundation is building, equipping, and staffing a medical school and hospital on a considerable scale and on a high level. It is hoped that this institution will (1) conduct a thorough and practical undergraduate course for physicians, (2) provide in due time graduate training for men and women who wish to devote themselves to laboratory work, clinical specialities, and teaching, (3) offer short courses for physicians who desire to keep abreast of progress in medical knowledge and skill, (4) afford reasonable opportunities for research, especially with reference to diseases peculiar to the Far East, and (5) help to extend in the Orient a popular knowledge of medicine and public health. In order to insure a thorough grounding in the studies fundamental to medical education, the Peking Union Medical College also maintains a Pre-Medical School. For the academic year 1919-1920 the enrolment of the institution was: pre-medical school thirty-four, medical school (one class) seven, graduate courses two, total

forty-three. For the year 1920-1921 the total will reach seventy-nine.

This Peking center ought in time to become not only an influence in North China and the Republic generally, but a rallying point for medical training and research for the entire Far East. It will maintain constant relations with Europe and North America. From time to time visiting professors from abroad will be in residence. To Peking will resort graduate students of ability and ambition. Practising physicians and medical missionaries will find it a place of stimulation, refreshment, and congenial comradeship. Here, too, there is reason to believe, original contributions will be made to the world's knowledge of disease and its prevention. Already promising beginnings have been reported. The Peking Union Medical College aims at becoming a significant station in the world-wide system of medical education and research.

Hospitals and Medicine in China

It is one thing to give Chinese men and women a modern medical training; quite another to provide the conditions under which that training can be of largest service to Chinese communities. Unless the native physician can have access to laboratory and operating room, unless he can maintain professional and personal

relations with competent and high-minded colleagues, unless he can count upon a certain confidence in Western methods among his fellow countrymen, the chances of permanent and worthy success are slight. Conservatism, faith in native medicine, family demands for quick commercial returns, absence of publicly enforced standards, temptation to compromise and quackery, beset the path of the Chinese doctor who undertakes to practise scientific medicine in his native land.

The chief agency for helping the native practitioner is the Western type of hospital, which gives him additional education, offers him facilities, aids him in maintaining his ideals, and helps to disseminate in the community knowledge of the aims and methods of both curative and preventive medicine. In carrying out its China plans, therefore, the Rockefeller Foundation is aiding many strategically situated hospitals—for the most part under missionary auspices—to improve their buildings and equipment and to increase the number of their doctors and nurses. Thirty-one institutions of this kind were aided during 1920.

In addition to maintaining the Peking center, the Foundation has, through the China Medical Board, made appropriations to a number of colleges in China for their pre-medical courses and has given aid to a medical school at Tsinan-fu. Scholarships for Chinese and missionary doctors have also been provided for study in both the Peking Union Medical College and in the United States. Moreover, the knowledge and experience of the Peking staff are available for all who are interested in medical education, hospital planning and administration, nurses' training, and other phases of Western medicine.

Training Health Personnel

Men rather than money insure efficiency in social effort. Preventive medicine depends for success on the leadership of well-trained and experienced specialists, administrators, sanitary engineers, laboratory workers, nurses, inspectors. To provide a training center for public health personnel, the Rockefeller Foundation agreed in 1917 to support a School of Hygiene and Public Health in connection with the Johns Hopkins University. In 1920 a staff of forty-three gave instruction to 100 students who represented twenty-five states and nine foreign countries.

In establishing the school attention was properly given first to organizing the fundamental departments which deal with the causes of contagious diseases, vital statistics, sanitary engineering, and the like. More recently the curriculum has been completed by providing instruction in public health administration and by affording

students opportunities to apply their knowledge to practical problems in the field. During the summer they have held positions under the United States Public Health Service, the state boards of health, and municipalities. Plans are under way to organize in a community near Baltimore a rural training area in which students will gain experience in the actual work of carrying out a modest and feasible countryside scheme for promoting public health.

During the autumn of 1920 the School conducted a six-weeks' special intensive course for public health officers. Twenty-nine men and women attended and seemed to derive much benefit from the instruction. A short course was also given for members of the staff of the International Health Board who are engaged in hookworm control. These are significant beginnings in putting the scientific resources of the School at the service of workers who are applying practically the results of research. The Journal of Hygiene which has been established under the auspices of the School will promote this same end and stimulate research as well.

The Foundation during 1920 continued to contribute to the support of a department of hygiene in the medical school of São Paulo University in Brazil. An American professor and a Brazilian who had been trained under Founda-

tion auspices in the United States were in charge of the department.

Fellowships for Thirteen Nations

In harmony with the principle that trained leadership is essential to all progress, the Rockefeller Foundation in its desire to promote medical education and public health on an international basis has not limited its aid to centers and citizens of the United States. Through the International Health Board, the China Medical Board, and the Division of Medical Education, promising individuals in thirteen different countries were granted during 1920 fellowships which enabled them to pursue advanced courses in preparation for institutional or government service as teachers, investigators, or administrators.

For training in public health twenty-seven fellows came from the following countries: Czechoslovakia, thirteen; Brazil, five; Canada, two; France, two; Colombia, one; Costa Rica, one; Salvador, one; Mexico, one; Porto Rico, one. Six Americans were also awarded fellowships either as prospective teachers in schools of hygiene or as members of the Health Board staff.

Fifty-seven persons received aid in preparing themselves for medical teaching or hospital service. This number included one Canadian, one Czechoslovakian, two Englishmen, two Brazilians, one Belgian, eleven Chinese graduate doctors, eight Chinese undergraduates, for seven of whom the China Medical Board assumed responsibility when the Harvard Medical School of China closed, four Chinese nurses, and twenty-seven American and British missionary doctors home on furlough from China who desired to take graduate courses in medicine and surgery.

To this total of ninety individuals who were working in the fields of curative and preventive medicine may be added twelve members of the International Health Board staff on study leave, and the eighteen fellows in physics and chemistry who were selected and supervised by a special committee of the National Research Council, to which the Rockefeller Foundation appropriated the necessary funds. Thus, during the year, a total of 120 students were supported in whole or in part by the Foundation.

It should be pointed out that these fellowships do not constitute in any sense an inflexible system in which any given nation has a vested right. The awards are made only to individuals of outstanding ability who have assurances of opportunities to engage in salaried teaching or public health service in their own countries. No aid is granted to persons who are planning to become immediately private practitioners or commercial laboratory workers.

Following Up Yellow Fever

In 1916 General Gorgas headed a Commission sent by the International Health Board to South and Central America to investigate and report upon the possibility of putting an end to the menace of yellow fever. The Commission recommended a direct attack upon the seed-beds of the disease in Guayaquil, Ecuador, and Merida, Yucatan, and the investigation of suspected areas in Venezuela, the east coast of Brazil, and the west coast of Africa.

As soon as General Gorgas was retired from the United States Army in the winter of 1918, he was entrusted with the organization of a campaign. Commissions were formed in the countries of Central America, and in Colombia, Venezuela, and Ecuador. Dr. Noguchi of the Rockefeller Institute for Medical Research had already carried on field investigations in Guayaquil and had found a germ which there was reason to believe was the inciting cause of yellow fever. From this organism a vaccine was prepared and administered to test the possibilities of rendering individuals immune to the disease.

Late in 1918 Dr. M. E. Connor of the International Health Board organized, with the hearty support of the city of Guayaquil and the government of Ecuador, a determined attack upon the Stegomyia mosquito, by which alone

the infection is communicated from person to person. The water in which the insects deposit their eggs was either drained away, or screened, or protected by larvæ-consuming fish. To such good purpose was the work done that by June, 1919, yellow fever had disappeared from Guayaquil. On December 1, 1920, the organization was turned over entirely to the local authorities.

An epidemic of yellow fever appeared in Central America in 1919-1920. It was traced to sources of infection in Mexico, which at that time was not ready to join in the common fight on the disease. Prompt measures in Guatemala, Salvador, and Honduras successfully restricted the infection.

A Commission to investigate conditions on the west coast of Africa left the United States in May, 1920. In London a representative of the British Government, and an English bacteriologist who had spent some time with Noguchi in New York, joined the party. General Gorgas was taken ill in London and turned over the leadership of the group to General Robert E. Noble. The Commission spent fifteen weeks in Nigeria, Sierra Leone, the Belgian Congo, Senegal, the Gold Coast, and Dahomey. No actual cases of yellow fever were encountered. Available records and the reported experience of local physicians seemed to indicate that yellow

fever had existed on the coast, but for a time at least had been driven into the back country. The enormous size of the regions involved, the difficulties of travel, the suspicions and secretive tendencies of the native population make it extremely difficult to carry on investigations. The Commission recommended that another group be sent to the west coast prepared to spend some time in studying the situation.

Recently in Mexico the prospects of yellow fever control have brightened. Late in 1920 representatives of the International Health Board were invited to go to Mexico City, a Mexican commission was organized, and there is every reason to hope that the sources of infection in Yucatan and southern Mexico will in due time be brought under control.

Noguchi's vaccine has played a significant part in recent developments of the campaign. At last reports more than 7,500 persons had been vaccinated. While it is still too early to make a definite announcement as to the effectiveness of the vaccine, the results so far are distinctly encouraging. Several Central American countries have agreed to accept certificates of vaccination in lieu of quarantine detention. Representatives of business houses are being vaccinated before they leave for fever-infested areas. Stocks of vaccine, prepared at the Rockefeller Institute,

are now available in all the countries where there is any likelihood that yellow fever may appear.

General Gorgas Dies on the Field

It was the hope of William Crawford Gorgas "to write the last chapter of the history of yellow fever." He was almost in sight of his goal when he died in London, July 4, 1920. An able and gallant soldier in a campaign against disease, he laid down his life on the field of battle. He was on his way to the west coast of Africa when the end came, and from his death-bed he gave directions for the prosecution of the work to which he was so loyally devoted.

After the American occupation of Cuba in 1898-1902, General Gorgas attained distinction for his notable services in ridding first Havana and then all of the island of yellow fever. These successes led to his appointment as Sanitary Director of the Panama Canal Zone. His remarkable administration of this great task gained for him new laurels. His advice was sought by the British Government, under whose auspices he made a trip to South Africa. From 1914 to 1918 (years which included the stirring period of America's participation in the World War), he served as Surgeon General of the United States Army. As soon as he retired, he entered the service of the International Health Board and

began energetically to organize an international fight against yellow fever. Just before he left for London, he received an invitation from Peru to become the public health leader of that country.

The last days of General Gorgas in Europe brought him new honors. At the International Hygiene Congress in Brussels he was awarded the Harben gold medal in recognition of his services to public health. When the General was ill in the Queen Alexandra Hospital in London, King George called upon him and conferred the Order of St. Michael and St. George. After General Gorgas died, the British Cabinet ordered an official state funeral in St. Paul's Cathedral in honor of this great American soldier who had devoted his powers not to the destruction but to the protection of human life. His career is inspiring the men upon whom have devolved the duty and privilege of seeking to realize his noble purposes.

Progress in Malaria Control

Since 1915 the International Health Board has been engaged in demonstrating the possibility of ridding small communities of malaria infection at a cost well within their resources. Experiments in towns in Arkansas and Mississippi have proved that the infection can be reduced by from 75 to 95 per cent at an annual

per capita cost, varying with conditions, from 45¢ to \$1.00. During the war the United States Public Health Service was strikingly successful in reducing malaria infection in the areas surrounding the army camps. From the outset the state boards of health and local authorities had a part in these undertakings.

As a result of a conference held in 1919, the United States Public Health Service, state boards of health, the International Health Board, and local authorities joined during the summer of 1920 in a concerted demonstration which included fifty-two towns in ten southern states. Each partner in the enterprise contributed personnel or funds, or both, to a common staff and a common budget. The machine worked smoothly. The specific results were gratifying. Adequate control was secured and the amount of malaria was definitely reduced at a per capita cost of 78¢, exclusive of central supervision. The by-products in community pride, popular education, and interest in health problems were valuable and give promise of future progress.

While the scientific basis of malaria control is well established, there is ample opportunity for experiment in testing various practical measures under different conditions. The infection is transmitted by the Anopheles mosquito, whose habits are known. Of these the most important

is the depositing of eggs in water. Furthermore, by means of quinine, the blood of an infected person may in almost all cases be sterilized—i. e., the disease may be eliminated. It follows that if the Anopheles can be prevented from breeding or from gaining access to individuals, or if malaria carriers can be freed from infection, the disease cannot survive. In a given locality one or all of these methods may be employed. Where water can be drained away, or covered with a film of oil, or policed by fish that eat the mosquito eggs, Anopheles control may be the sole method. In regions where water is more abundant, resort may be had to screening or to quinine.

In Hinds county, Mississippi, a rural area of thirty-six square miles with a population of 830 was selected in 1918 for an experiment in country-side mosquito control. The work was continued in 1920 and demonstrated that a reduction of 76.7 per cent in the disease could be secured at a cost which is not prohibitive. The top minnow proved to be an effective ally. It is estimated that each minnow eats about 165 large mosquito larvæ and many eggs a day. In Sunflower county in the same state the sterilizing of malaria carriers, begun in 1918, was prosecuted with the result that the rate of infection was still further reduced and the per capita cost lowered. At Mound, Louisiana, experiments in screening

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Fig. 7.—Vegetation along the banks of a bayou. Streams like this afford favorite breeding places for the malaria mosquito

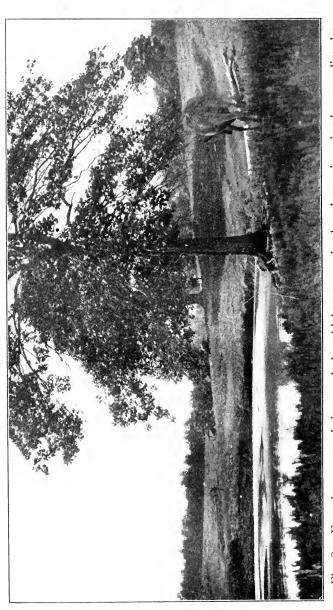


Fig. 8.—Experiments are being made in which cows and other domestic animals are enlisted to prevent the breeding of malaria mosquitoes by cropping close the vegetation along the banks of bayous, streams, and ponds. The photograph shows one of the animals used for this purpose

houses were carried out. The records showed that what an old colored woman called "screams" are of appreciable value in malaria control.

For some time the International Health Board has had in mind the possibility of adapting to tropical countries the methods of malaria control which were so successfully employed in Arkansas. During the year a representative was sent to Porto Rico to make investigations. He reported that the conditions were not favorable for applying the Arkansas plan, but that there were good reasons for believing that mosquito control measures adapted to tropical agricultural conditions would yield significant results.

Cows and Fish Versus Mosquitoes

One anti-malaria experiment in the bayou region of Louisiana is sufficiently novel to deserve a separate paragraph. The bayou is a sluggish stream carrying a good deal of vegetation and affording a favorite breeding place for the Anopheles. By the damming of a bayou and impounding the water for a stretch of several miles, a lake is formed. From this the vegetation is removed, and the top minnows are given their opportunity. The fish eat the mosquito eggs as fast as these are laid. Only one more obstacle is to be overcome. If the vegetation on the banks is permitted to grow freely, it forms a protected

zone in which eggs may be deposited beyond the reach of the top minnows.

In some way the grasses on the banks must be cleaned away if the breeding of the mosquitoes is to be prevented. To meet this need the strips along the bayou are turned into pasture land on which cattle are allowed to feed. The cows crop the grass close along the low banks and leave the larvæ an easy prey to the eager minnows. Thus the natural appetites of minnow and cow work together for the protection of man. Moreover, the dairy and beef industry is fostered in a region which needs diversification of agriculture. It is too early to say whether this experiment will be completely successful; the indications so far are encouraging.

"Unhooking the Hookworm"

This is the title of a motion-picture film which has recently been made under the auspices of the International Health Board for use in anti-hookworm campaigns in various parts of the world. The hatching of the hookworm, its penetration of the human body, its progress through the blood, lungs, and throat to the digestive tract, its parasitic rôle, its propagation, are set forth vividly by ingenious devices of micro-photography and animated diagrams. Successive scenes illustrate the causes of soil pollution, the process of in-

fection, the symptoms of the disease, the methods of treatment, the results of cure, and the need of sanitary precautions. It is now being sent out for use in different countries and will doubtless be modified as a result of actual tests in the field. Preliminary reports indicate that the film is likely to prove distinctly serviceable in impressing communities with the menace of the infection and with the possibilities of cure and prevention.

During 1920 the hookworm work, always undertaken in concert with government agencies, went steadily forward in nine states of the South. In the West Indies campaigns were prosecuted in Jamaica, St. Lucia, and Trinidad; a survey was made in Santo Domingo; and in Porto Rico, after a field study, relief measures were inaugurated. In Central America work was continued in Guatemala, Nicaragua, Salvador, Costa Rica, and Panama. In South America campaigns were conducted in Colombia and in ten states of Brazil, where government funds in large amounts were provided. In the Far East anti-hookworm measures were carried out in Australia and Papua, Siam, Ceylon, India, Mauritius, and the Seychelles Islands. Thus control or survey services were rendered to forty-two different governmental areas in nineteen different countries of the world. In every case the government

invited aid, assumed increasing responsibility, and looked forward to taking over the entire enterprise.

Hookworm Work and Health Services

From the beginning of its hookworm campaign the International Health Board has thought of the control of this disease chiefly as a means of demonstrating to a given community in a concrete way the meaning of public health and the possibilities of preventive medicine. The hope has been that countrysides, towns, and states would gradually be educated to the idea of establishing general health organizations.

In the Southern States it has been the policy of the Board to encourage the establishment of county health administrations and through these agencies to broaden the scope of local effort from hookworm disease to other maladies and sources of danger. The Board's assistance has been limited to a few demonstrations and has been conditioned upon state and county appropriations which aggregate half or three-fourths of the total budgets. In the states where the county plan is most firmly established, the Board's aid is gradually being withdrawn. It may be said that so far as the United States is concerned the Board's specific hookworm work is practically at an end. Anti-hookworm measures from now on

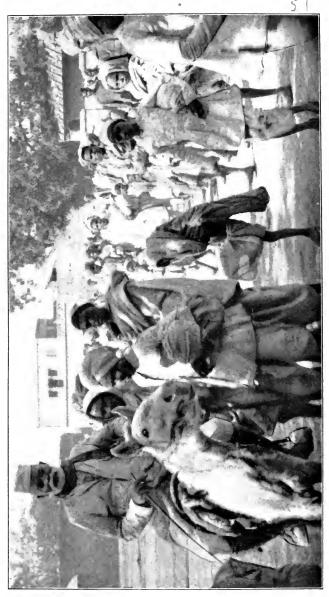


Fig. 9.—Scene in India, from the hookworm film

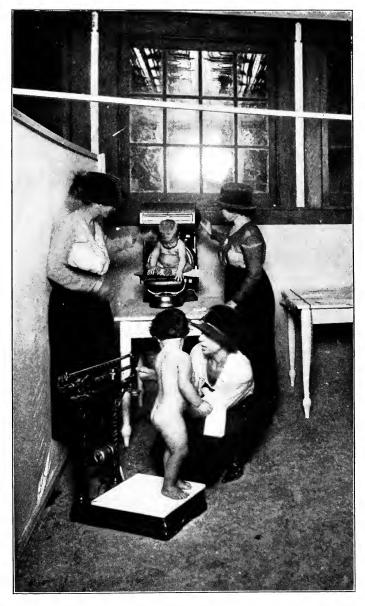


Fig. 10.—Baby clinic: a growing phase of county health work

will be a regular part of the health campaigns of counties and states.

Brazil affords a striking example of the educating effects of anti-hookworm measures. The work began in 1916; in four years it extended to the Federal District and to nine states, which appropriated, for 1921, the sum of \$2,300,000 for rural sanitation. Last October a national department of public health was created. Thus, from hookworm measures as a beginning, general public health policies are being formulated.

Queensland, in Australia, two years ago entered into a five-year arrangement with the International Health Board for an anti-hookworm campaign. Last year the work was extended in Papua; now it is proposed to include New Guinea. The undertaking aroused wide-spread interest not only in this specific disease but in public health generally. An agitation was begun for the creation of a national department of health. Late in 1920 the Far Eastern Director of the International Health Board sailed for Australia. During his stay there Government decided to create the new department.

Tuberculosis Commission to France Ending Its Work

In the midst of the war (1917) the Rockefeller Foundation sent a Commission to France to aid that country in organizing a fight upon tuberculosis, by which under existing conditions the population was seriously menaced. The Commission's plan included: (1) demonstrations of dispensary and visiting nurse service in the XIXth ward of Paris and in the department of Eure-et-Loir, (2) training courses for doctors and health visitors, (3) encouragement of the organization of committees and dispensaries in all parts of France, and (4) a campaign of popular education by means of traveling exhibits, lectures, slides, moving pictures, posters, pamphlets, and press articles.

The response of the French Government, private societies, and local communities has been most enthusiastic. In June, 1920, the chamber and senate voted three million francs for tuberculosis work and promised subventions for building sanatoria in all the departments of France. By the end of the year 271 dispensaries were in actual operation and 178 more were to be opened in the early future. Two hundred fifteen diplomas had been granted to visiting nurses who had completed courses of training. The short courses organized in Paris for dispensary doctors were most successful and sent men back to the provinces with a new enthusiasm and a keen appreciation of the possibilities of dispensary service. The educational campaign covered

twenty-eight departments. A railway car was especially equipped for publicity purposes by the Commission and was to be put in service early in 1921.

It has been the intention from the outset to turn the tuberculosis organization over to the French as soon as this can be done in justice to the work and in fairness to governmental and other agencies. The dispensary systems in Paris and in Eure-et-Loir were transferred to the local authorities during 1920. Plans are under way to hand over the remaining activities in 1922. It is hoped that arrangements will be made by which these activities will be carried on under French auspices without any break in continuity or impairment of efficiency. Before 1922 the Commission is likely to be formally recalled, although the services of individuals may be made available for a longer time in connection with certain French agencies.

All Americans who have been connected with the Commission's work have felt it a privilege to be associated with French officials, doctors, private citizens, and communities in this inspiring undertaking. Ties of mutual esteem and good-will have been formed which will help to bind together the two republics.

Working With Czechoslovakia

One of the early acts of this vigorous new nation was to establish a Ministry of Health. Interested in this development, the General Director of the International Health Board visited Prague and on his return submitted to the Foundation a plan for aiding the new department and the country. The proposal included four items: (1) lending to the government an American expert in public health administration, (2) providing fellowships for a selected group of young doctors pledged to public health work, (3) assisting in the development of a public health laboratory service, and (4) bearing the expenses of a Czechoslovak commission which should study public health administration in England and in the United States.

During 1920 all these things were brought to pass. In July Colonel Frederick F. Russell, the laboratory expert of the International Health Board, set out for Prague. In October nine young Czech doctors arrived in the United States to begin their studies. Mr. Selskar M. Gunn took up his residence in Prague and put his knowledge and experience as a public health administrator at the disposal of the Ministry of Health. A commission was selected and reached the United States in November. After visiting significant centers of public health laboratory

and other services, the commission sailed for England, where further knowledge was gained under the auspices of the British Ministry of Health.

The policy outlined above is based upon the idea that trained personnel, a knowledge of scientific methods, and an appreciation of administrative efficiency are fundamental to any constructive public health work. The unification of laboratory service in close relation with the University of Prague has already suggested the idea of establishing under government auspices a school of hygiene for the training of the laboratory workers, vital statisticians, specialists in epidemics, and administrators who will be needed if substantial progress is to be made.

Sundry Items of Aid and Service

In addition to the more formal projects which have already been described, the Foundation and its Boards rendered many forms of service and made a number of appropriations. Expert advice about laboratory organization was given to the state boards of health of Alabama, Mississippi, and Kansas. Officers made studies in Europe, Brazil, and China. Conferences were held on nurses' training and on various aspects of hospital administration, and funds were provided to defray the expenses of committees which

are studying these questions. Various projects of the National Committee for Mental Hygiene received Foundation support. Several surveys were made by the Foundation's research department. An exhaustive bibliography of hookworm disease, on which work has been under way for several years, was practically completed. A contribution was made to a hospital service bureau which was established by the American Conference on Hospital Service. A dispensary demonstration in New York City was inaugurated. A bibliographical agency in Switzerland was assisted.

Applications for Aid

During 1920 approximately 800 applications for aid in various fields were received. The Foundation has restricted its work almost exclusively to a few broad undertakings in public health and medical education. In order to accomplish results of value in these, it finds it necessary to decline applications for projects in other fields, although it recognizes that many of these applications are for items of great value in themselves.

Table 1 lists the applications received and acted upon during the year 1920.

TABLE 1: APPLICATIONS FOR AID RECEIVED AND ACTED UPON DURING 1920

	CLASSIFICATION OF APPLICATION	RECEIVED	GRANTED	DECLINED
	1. Public Health	68	6	62
	tion and medical research General education (including	103	36	67
٠	educational projects and re- search other than medical)	83	4	79
4	4. Foreign relief or reconstruc-	59	2	57
ŧ	5. National movements in fields other than 1 and 2	18		18
6	6. Campaigns to influence public opinion	18		18
7	7. Local churches and institu-	124		124
8	tions	124		124
	gifts, medical treatment, education)	115		115
	9. Financing of books, plays, inventions, etc	39		39
10	 Investigation, reward, or pur- chase of alleged medical 			
1	discoveries	114 47	2	$\begin{array}{c} 114 \\ 45 \end{array}$
	TOTAL	788	50	738

Finances for 1920

Table 2 gives a summary of receipts and expenditures for the fiscal year 1920.

The income from invested funds was a little less than nine millions. A balance of four and a half millions was carried over from 1919, of which over three millions had been pledged. Likewise a balance of six millions has been carried forward into 1921, of which four and a half millions have been pledged. The table on pages 72 to 74 presents a complete list of expenditures

during 1920 for all purposes. A full statement from the Treasurer with all details as to investments, other property, income, and expenditures of the Foundation is contained in the regular annual report of the Rockefeller Foundation, which will be issued in the autumn.

TABLE 2: RECEIPTS AND DISBURSEMENTS IN 1920

RECEIPTS		EXPENDITURES	
Balance from 1919 (Including refunds on 1918 accounts) Income during 1920	\$4,554,442 8,727,730	Public Health Medical Education Miscellaneous Administration	\$2,095,572 4,482,964 286,842 212,478
		Balance carried forward (\$4,558,522 of which represented appropriations for 1920 and prior years not yet called for)	\$7,077,856 6,204,316
-	\$13,282,172		\$13,282,172

Program for 1921

The work of the Foundation for any given year is projected in large part by its work for the immediately preceding period. Plans requiring for their development a period of years present new features of progress; adaptations are made to changing conditions; in general the work of the Foundation for 1921 will consist of continued demonstrations in the control of certain diseases and the promotion of training in medicine and

public health. Specific items of work which may be anticipated are as follows:

Medical Education. Formal opening in September of the Peking Union Medical College, constructed, staffed, and supported by the Foundation's China Medical Board.

Aid to medical school at Tsinan-fu and to certain pre-medical schools.

Appropriations to a number of foreign mission and native hospitals in China to increase their efficiency as centers for postgraduate experience, and as a means of familiarizing communities with modern medicine.

Conclusion of arrangement with the Free University of Brussels and the city of Brussels by which the Foundation will assume a share of the expense of rebuilding and reorganizing the University Medical School and City Hospital.

Payment to the University of London and the University College Hospital of \$1,000,000 of the total of \$5,000,000 pledged by the Foundation toward an enlargement of the plant and staff of a unified modern medical center in London.

A contribution of \$1,000,000 to Columbia University toward rebuilding and reorganizing its medical school.

Payments to six medical schools in Canada of portions of contributions made to insure sub-

stantially increased building and educational facilities.

Continued provision of scientific literature to medical schools in European countries.

Public Health Training. Continued support of School of Hygiene and Public Health at Johns Hopkins University.

Consideration of means of increasing facilities in the United States for the training of public health officers.

Consideration of aid to the establishment of a public health institute by the Czechoslovakian Government at Prague.

Continued aid to the department of hygiene in the medical school of São Paulo University, Brazil.

Fellowships. Support of selected fellows from various countries for advanced study of public health and medicine.

Maintenance of a number of fellows who are engaged in advanced work and research under the auspices of a special committee of the National Research Council.

Public Health Work. Continuation and extension of campaigns against yellow fever, malaria, and hookworm disease.

The development of a public health laboratory service.

Surveys and Research. Aid to studies in the training of nurses in the United States and Europe, dispensary organization and service, and hospital administration.

Support of researches in hookworm disease.

Continuation of special studies under the auspices of the National Committee for Mental Hygiene, in the care and treatment of the insane and mentally deficient.

Miscellaneous Items. Contributions to a central office plan for certain public health agencies in New York, to a bibliographical center for biological literature at Zurich, to a library service bureau of the American Hospital Conference at Chicago, and to a few undertakings which now lie outside the scope of the Foundation, but were promised its support for a period of years.

These and similar plans which may be matured constitute the definite means by which the Foundation is seeking to further its purposes.

The Commonwealth of Science

Science knows no national boundaries. It is a world product, a common fund of knowledge to which all nations contribute and upon which each may freely draw. To keep open the channels of communication by personal migration and by printed page, to encourage the training of specialists, to foster the growth of institutions, to stimulate research, to encourage the application of scientific knowledge to the needs of nations, communities, and individuals, are tasks upon the successful performance of which largely depends the progress of the world in economic efficiency, physical health, and international good-will. It is the aim of the Rockefeller Foundation to have a part in this great movement by helping to increase the common store of knowledge about the causes of disease, and through demonstrations and the services of trained experts to diffuse this information as widely as possible among all peoples. Thus does the Foundation seek to fulfil its chartered purpose "to promote the well-being of mankind throughout the world."

THE ROCKEFELLER FOUNDATION Report of the Secretary

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To the President of the Rockefeller Foundation: Sir:

I have the honor to submit herewith my report on the activities of the Rockefeller Foundation for the period January 1, 1920, to December 31, 1920.

Respectfully yours, EDWIN R. EMBREE, Secretary.

SECRETARY'S REPORT

The review by the President outlines the policies by which the Rockefeller Foundation is being guided in its work, sketches its present program, and describes the results aimed at and accomplished during the year 1920. The following report depicts the organization and the agencies through which these results were reached, and outlines the methods by which the programs of the several departments were carried out.

Organization

The following are the members and the principal officers of the Rockefeller Foundation:

MEMBERS

John G. Agar Wallace Buttrick Simon Flexner Raymond B. Fosdick Frederick T. Gates A. Barton Hepburn Harry Pratt Judson John D. Rockefeller John D. Rockefeller, Jr. Wickliffe Rose Julius Rosenwald Martin A. Ryerson Frederick Strauss George E. Vincent

EXECUTIVE COMMITTEE

George E. Vincent, Chairman
Wallace Buttrick Wickliffe Rose
Frederick Strauss
Edwin R. Embree, Secretary

OFFICERS

John D. Rockefeller, Jr. Chairman of the Board of Trustees

George E. Vincent President Edwin R. Embree Secretary

Richard M. Pearce Director of the Division of Medical Education

Charles C. Williamson Director of Information Service

L. G. Myers Treasurer
Robert H. Kirk Comptroller

The Foundation holds regular meetings in February, May, and December. The Executive Committee meets frequently during the intervals to execute programs within general policies approved by the Trustees.

Departmental Boards

The Foundation accomplishes its work largely through its subsidiary or departmental organizations, which are devoted to special functions, and which depend upon the Foundation for funds. These with their officers and members are:

INTERNATIONAL HEALTH BOARD

George E. Vincent, Chairman

Hermann M. Biggs
Wallace Buttrick
Simon Flexner
Frederick T. Gates
Edwin O. Jordan

John D. Rockefeller, Jr.
Wickliffe Rose
Victor C. Vaughan
William H. Welch

Edwin R. Embree, Secretary
Florence M. Read, Assistant Secretary

Wickliffe Rose General Director
John A. Ferrell, M.D. Director for the United States
Victor G. Heiser, M.D. Director for the East

H. H. Howard, M.D.

Director for the West Indies

Director of Public Health Laboratory

Service

CHINA MEDICAL BOARD

George E. Vincent, Chairman and General Director
Roger S. Greene, Resident Director in China
Wallace Buttrick John R. Mott
Simon Flexner Francis W. Peabody
Frederick L. Gates John D. Rockefeller, Jr.
Frank J. Goodnow Wickliffe Rose
Harry Pratt Judson William H. Welch
Edwin R. Embree, Secretary

Margery K. Eggleston, Assistant Secretary

Assistance to Other Agencies

In addition to the work carried out through the departmental organizations described above, the Rockefeller Foundation has contributed during the year to the accomplishment of work undertaken by other and unaffiliated organizations.

On pages 72 to 74 will be found a summary of payments made by the Rockefeller Foundation for all purposes during the year 1920. This tabular summary outlines, in terms of expenditures, the work described in terms of aims and results in the President's Review. In many instances these payments involved sums expended on account of appropriations made in former years. On the other hand, they represent in some instances but partial payments on many of the appropriations, made during 1920, which will provide for continuing work during succeeding years. For a full statement of the finances of the Foundation, see the Report of the Treasurer, pages 289 to 358.

TABLE 3: EXPENDITURES OF THE ROCKE-FELLER FOUNDATION FOR THE YEAR 1920

I. PUBLIC HEALTH

	TODDIO IIDIIDIII		
A.	International Health Board		
	1. Hookworm, Malaria, and Yellow Fever		
	Work	\$965,155	
	2. Tuberculosis in France	522,459	
	3. Fellowships and Public Health Educa-	44.000	
	tion	44,289	
В.	4. Administration	91,472	
	1. Mental Hygiene	94,594	
	2. National Organization for Public	,,,,,,	
	Health Nursing	5,000	
	(Final payment on three-year pledge	2,000	
	made in 1917)		
	3. Committee for Survey of Conditions		
	and Possible Cooperation in Care		
	of Crippled Children in New York	5,487	
	4. Committee for the Study of Public	,	
	Health Nursing Education	22,293	
	5. Hospital and Dispensary Studies and	,	
	Service	14,602	
C.	School of Hygiene and Public Health of		
	Johns Hopkins University	330,221	
			\$2,095,572
II.	MEDICAL EDUCATION		
A	China Medical Board		
41.	1. Peking Union Medical College		
		\$2 772 186	
	(a) Land and Buildings		
	(b) Operation	483,060	
	(b) Operation	483,060 225,151	
	(b) Operation	483,060 225,151 62,221	
	(b) Operation	483,060 225,151 62,221 29,095	
	(b) Operation	483,060 225,151 62,221 29,095 13,620	
В.	(b) Operation	483,060 225,151 62,221 29,095 13,620 56,262	
В. С.	(b) Operation 2. Other Medical and Pre-Medical Schools 3. Hospitals 4. Fellowships and Scholarships 5. Miscellaneous 6. Administration 6. London Medical Center	483,060 225,151 62,221 29,095 13,620 56,262 174,625	
C.	(b) Operation	483,060 225,151 62,221 29,095 13,620 56,262 174,625 518,750	
C. D.	(b) Operation	483,060 225,151 62,221 29,095 13,620 56,262 174,625 518,750 80,972	
C. D. E.	(b) Operation 2. Other Medical and Pre-Medical Schools 3. Hospitals 4. Fellowships and Scholarships 5. Miscellaneous 6. Administration London Medical Center Canadian Medical Program	483,060 225,151 62,221 29,095 13,620 56,262 174,625 518,750	
C. D. E. F.	(b) Operation	483,060 225,151 62,221 29,095 13,620 56,262 174,625 518,750 80,972 3,274	
C. D. E. F. G.	(b) Operation	483,060 225,151 62,221 29,095 13,620 56,262 174,625 518,750 80,972 3,274 40,463	

III. MISCELLANEOUS

(Chiefly payments on previous pledges) A. American Academy in Rome (Payment on ten-year pledge made in 1914)	\$10,000
*B. American Committee for Relief of Viennese Medical Scientists	10,000 9,793
D. American University Union in Europe E. Committee of Reference and Counsel of	15,000
Annual Foreign Missions Conference of North America	40,000
F. Concilium Bibliographicum, Zurich, Swit-	
G. National Research Council (For Fellowships in Physics and Chem-	7,532 50,467
istry) H. National Information Bureau	1,000
(For membership for the year 1919–1920)	-,
I. New York Association for Improving the Condition of the Poor	20,000
J. Final payments on account of Work and	
Disposition of War Demonstration Hospital	118,629
K. Grand Chenier Bird Refuge—taxes and expenses	4,421
(Purchased in 1914 and supervised by Louisiana Department of Conserva- tion)	1,121

\$286,842

^{*}Payments on an appropriation of \$1,000,000 to the Child Feeding fund of the American Relief Administration were not made until after the close of the year and hence do not appear in this summary.

74 THE ROCKEFELLER FOUNDATION

IV. ADMINISTRATION

A. Maintenance of Executive Offices and Treasurer's Office B. Reports and Publications C. Books and Furniture	\$173,063 32,029	\$212,478
		\$7,077,856

Funds and Property

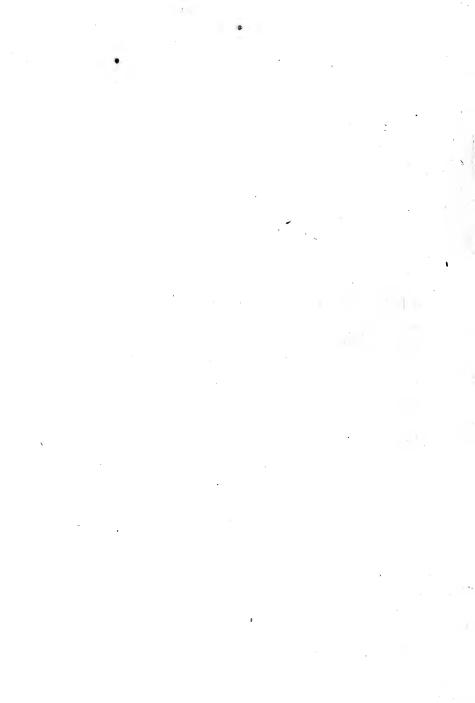
As of December 31, 1920

PRINCIPAL FUNDS

General Fund	\$171,204,624 3,111,288
Gifts of John D. Rockefeller	
	\$174,432,712
LANDS, BUILDINGS, AND EQUIPMENT	
In China: Medical School Lands, Buildings, and Equipment	\$7,528,505 24,331
·	\$7,552,836
UNDISBURSED INCOME	
General Income (of which \$4,558,521.98 represented appropriations payable in 1920 and prior years, but	
which had not been called for)	\$6,204,316
Estate Laura S. Rockefeller	
Arthur Theodore Lyman Endowment 466	32,204
	\$6,236,520

INTERNATIONAL HEALTH BOARD

Report of the General Director



INTERNATIONAL HEALTH BOARD

Report of the General Director

To the President of the Rockefeller Foundation: Sir:

I have the honor to submit herewith my report as General Director of the International Health Board for the period January 1, 1920, to December 31, 1920.

Respectfully yours,

WICKLIFFE ROSE, General Director.

INTERNATIONAL HEALTH BOARD

OFFICERS AND MEMBERS

GEORGE E. VINCENT, Chairman WICKLIFFE ROSE, General Director HERMANN M. BIGGS WALLACE BUTTRICK SIMON FLEXNER FREDERICK T. GATES WILLIAM C. GORGAS¹ EDWIN O. JORDAN STARR I. MURPHY² JOHN D. ROCKEFELLER, JR. WILLIAM T. SEDGWICK³ VICTOR C. VAUGHAN WILLIAM H. WELCH

EDWIN R. EMBREE, Secretary

Deceased July 4, 1920.
 Deceased April 4, 1921.
 Deceased January 25, 1921.

PERSONNEL OF STAFFS DURING 19201

ADMINISTRATIVE STAFF

WICKLIFFE ROSE, General Director

JOHN A. FERRELL, M.D., Director for the United States

VICTOR G. HEISER, M.D., Director for the East

HECTOR H. HOWARD, M.D., Director for the West Indies

L. W. HACKETT, M.D., Associate Regional Director (for Brazil)

Ernst C. Meyer, Director of Surveys and Exhibits
F. F. Russell, M.D., Director of Public Health Laboratory Service

FIELD STAFF

HOOKWORM

Australia .	W. A. Sawyer S. M. Lambert ²
Brazil.	L. W. Hackett
DRAZIL	J. L. Hydrick
Bahia	F. L. Soper
Maranhão	F. L. Soper
Minas Geraes	G. K. Strode
Pernambuco	F. L. Soper
Rio Grande do Sul	Alan Gregg
Santa Catharina	Alan Gregg
Ceylon	W. P. Jacocks
	S. A. Winsor ²
	C. H. Yeager
	G. G. Hampton

COLOMBIA

F. A. Miller

¹ Personnel employed by Government in co-operative work not listed. ² Special Staff Member.

80 THE ROCKEFELLER FOUNDATION

Costa Rica Louis Schapiro

J. E. Elmendorf, Jr.

GUATEMALA E. I. Vaughn¹

India (Madras Presidency; survey) G. P. Paul

JAMAICA P. B. Gardner (resigned)

B. E. Washburn
J. W. Visher (resigned)

Mauritius (survey) J. F. Kendrick

NICARAGUA D. M. Molloy

PANAMA F. A. Miller (transferred

to Colombia) F. C. Caldwell

PORTO RICO (survey) J. B. Grant

St. Lucia R. B. Hill (acting)

Salvador C. A. Bailey

Santo Domingo (survey) J. B. Grant

SEYCHELLES J. F. Kendrick

Siam M. E. Barnes

Trinidad G. C. Payne R. B. Hill

W. C. Hausheer

COUNTY HEALTH WORK IN UNITED STATES

ALABAMA F. W. Dershimer
A. L. McKay

KANSAS A. J. Warren

Kentucky P. W. Covington

¹Special Staff Member.

D. B. Wilson New Mexico

F. H. Busby (resigned)

NORTH CAROLINA

J. F. Docherty

MALARIA

E. B. Johnson¹ ALABAMA

L. G. Hastings1 ARKANSAS

William Ropes1

H. A. Taylor LOUISIANA

F. P. Gilbert1 H. W. Green¹ F. E. Hulse¹ J. J. Mieldazis1 L. J. Petritz

H. H. Howard MISSISSIPPI

C. C. Bass1 J. L. Clarke1

NICARAGUA F. E. Hulse¹

D. M. Molloy

C. E. Buck¹ NORTH CAROLINA

PORTO RICO H. W. Green¹

SOUTH CAROLINA C. E. Buck¹

TEXAS E. H. Magoon¹

George Parker1

VIRGINIA E. H. Gage¹

YELLOW FEVER

YELLOW FEVER ADVISORY COUNCIL²

Henry R. Carter, M.D., Assistant Surgeon General, United States Public Health Service

Special Staff Member.
 Not staff members; appointed to serve in an advisory capacity.

Juan Guiteras, M.D., Director of Public Health, Cuba Joseph H. White, M.D., Assistant Surgeon General, United States Public Health Service

Hideyo Noguchi, M.D., Rockefeller Institute for Medical Research

YELLOW FEVER COMMISSION TO THE WEST COAST OF AFRICA

W. C. Gorgas, Chairman (deceased)

R. E. Noble, Assistant Surgeon General, U. S. A. Juan Guiteras, Director of Public Health, Cuba

Adrian Stokes, Assistant to Professor of Pathology, Trinity College, Dublin

A. E. Horn, West African Medical Service

W. F. Tytler, Member of Staff of Medical Research Council, London

Mexico and Central America T. C. Lyster

ECUADOR M. E. Connor

GUATEMALA E. I. Vaughn¹
H. K. Marshall¹

Mexico M. E. Connor

B. W. Caldwell¹
I. J. Kligler
Hideyo Noguchi

NICARAGUA D. M. Molloy

Salvador C. A. Bailey
W. H. Davies¹

TUBERCULOSIS

TUBERCULOSIS IN FRANCE

L. R. Williams, 1 Director

B. L. Wyatt¹

S. M. Gunn¹

Alexandre Bruno¹

F. Elisabeth Crowell¹

¹ Special Staff Member.

SPECIAL

SCHOOL OF HYGIENE AND PUBLIC HEALTH, SÃO PAULO

S. T. Darling, Professor of Hygiene and Director of Laboratory

W. G. Smillie, Assistant Professor of Hygiene

G. H. de Paulo Souza¹

F. Borges Vieira1

PUBLIC HEALTH ADMINISTRATION, CZECHOSLOVAKIA

S. M. Gunn¹

ON LEAVE

W. T. Burres S. T. Darling¹

AT HOME OFFICE

C. W. Wells (in charge of fellowships)

IN TRAINING

Alabama A. L. McKay

Arkansas William Ropes¹

COSTA RICA J. E. Elmendorf, Jr.

LOUISIANA F. E. Hulse¹

L. J. Petritz

Mississippi and Ceylon G. G. Hampton

MISSISSIPPI AND TRINIDAD W. C. Hausheer

New Mexico F. H. Busby (resigned)

NORTH CAROLINA J. F. Docherty

NORTH CAROLINA AND NEW MEXICO D. B. Wilson

Special Staff Member.

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Antonio Antonio

OPERATIONS IN BRIEF

In the development of medicine emphasis is shifting from cure to prevention. Despite the fact of world-wide financial depression the year has been one of encouraging progress in public health. Government appropriations have been increased. New services involving continuing expenditures have been created and men are being trained for their administration. In response to the appeal of opportunities far in excess of its resources the Board has shared in an increasing number of projects in something more than fifty states and countries throughout the world.

Promoting Health in Many Lands

The Board brought its tuberculosis work in France well within sight of the completion of its transfer to the French by the end of 1922; took up the fight against yellow fever in Mexico; continued it in Guatemala, Honduras, Nicaragua, and Salvador; brought to successful conclusion the effort to free Guayaquil and Ecuador of the infection, and sent a yellow fever commission to West Africa to make a preliminary study of the situation; joined forces with federal, state, and local authorities in a series of demonstrations in

malaria control by anti-mosquito measures in ten southern states; made a study of conditions in Argentina, Porto Rico, and Nicaragua with a view to extending its work in malaria control to tropical regions; pushed the fight against hookworm disease as a means of creating popular interest in public health under forty-two governments distributed over the more heavily infected regions; carried out a series of scientific studies yielding significant results in the fields of hookworm disease and malaria control; aided in the development of a rural county health service in twelve states; co-operated with the new ministry in developing public health administration in Czechoslovakia; assisted four state and national departments of health in establishing or further developing their public health laboratory service; and contributed toward the development of schools of hygiene at Prague and at São Paulo, Brazil, aided state boards of health in maintaining intensive short courses for workers in the service, and provided fellowships in public health for thirty-four selected students from ten countries. The object and effect of the effort in all countries have been to create popular sentiment in support of public health, to increase appropriations for health purposes, and to promote the development of permanent agencies for the control of disease, the cultivation of

hygiene as a science, and the training of men for public health service.

Fighting Yellow Fever

Yellow fever, ignoring as it does political boundary lines and disturbing directly or indirectly the commerce of all nations, presents a particularly strong appeal for concerted effort on an international scale. During the year 1920 operations against the disease were in progress in all infected areas: on the east coast of Brazil; in Ecuador and Peru; in Guatemala, Honduras, Nicaragua, and Salvador; in Mexico; and in West Africa.

In Brazil. The infected area in Brazil is being steadily reduced. Extending in former

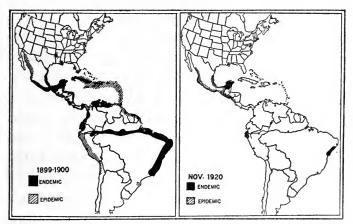


Fig. 11.—Result of twenty years' war on yellow fever. Few endemic or epidemic centers remain in the Western Hemisphere

years from Rio de Janeiro along the east coast to the mouth of the Amazon river and up the Amazon valley to Iquitos in Peru, the disease is now confined to a narrow coastal strip from Pernambuco to Bahia. These two ports are suspected as endemic foci from which the infection spreads from time to time to the surrounding regions. A number of sporadic outbreaks early in the year were promptly extinguished. The situation would seem to call for an organized attack on the breeding places of the Stegomyia mosquito throughout the danger zone, with special concentration of effort on the two strategic centers: Pernambuco and Bahia. Operations are under the Brazilian National Department of Health, which has made available ample funds for the purpose.

In Ecuador. Yellow fever quarantine against Guayaquil, for more than seventy-five years a dreaded seed-bed of infection, has been lifted. Control measures were inaugurated in November, 1918. Effort was centered on the breeding places of the Stegomyia. As the mosquito index was lowered the case rate fell rapidly from eighty-eight in December, 1918, to two in May, 1919, since which time no case has been reported from Guayaquil or Ecuador. After more than a year of continued mosquito control dating from the last reported case of yellow fever, Gov-



Fig. 12.—The late Major General William Crawford Gorgas. At the time of his death General Gorgas was Director of the Yellow Fever Commission of the International Health Board

A TRIBUTE TO GENERAL GORGAS By William H. Welch, M.D.

The following minute from the pen of Dr. William H. Welch was incorporated in the records of the International Health Board at its meeting on May 24, 1921:

Major General William Crawford Gorgas, a member of the International Health Board and the Director of its Yellow Fever Commission, died in London July 4, 1920, while on his way to the west coast of Africa to investigate the prevalence and importance

of yellow fever in that region.

General Gorgas, by the conquest of yellow fever in Havana and the control of this and other pestilential diseases on the isthmus of Panama, had won world-wide recognition as a sanitary administrator. American and European countries alike sought his advice and services for the control of endemic and epidemic diseases. One of the most important of his foreign missions was to the Transvaal, where the measures he recommended resulted in markedly reducing the high mortality rate of pneumonia.

In January, 1914, General Gorgas became Surgeon General of the United States Army, and in 1915, in recognition of his work in sanitating the Canal Zone, he was created Major General by special act of Congress. Throughout the period of the World War he served as Surgeon General of the United States Army. The confidence reposed in him by the army, the medical profession, and the general public did much to enhance the value of his services in pro-

tecting the health of the American troops.

Years before his death his investigations and experiences with yellow fever had convinced him that in the Western Hemisphere the disease was kept alive by its prevalence in a few endemic foci. By means of a successful attack on the disease in these foci he considered it feasible to eliminate the infection from the New World. The stamping out of the disease in Guayaquil, and the encouraging prospect of controlling the infection in other parts of South America and in Central America, fully justify this faith of General Gorgas.

It is not too much to state that the results accomplished through the administrative genius of Gorgas, coupled with the scientific discoveries of others—notably those of Walter Reed and his colleagues on the United States Army Yellow Fever Commission—have repaid many times over all the money that has been expended for the support of scientific research. Their work has resulted in saving untold thousands of human lives and much treasure, in protecting the American sea-coasts from the invasion of a dreadful scourge, in the construction of the Isthmian Canal through a pestilential zone transformed into one of the most healthful on the globe, and in reclaiming for civilization many pest-ridden regions in tropical countries throughout the world.

The genial, kindly qualities of General Gorgas endeared him to all his associates. To his colleagues on the Board the memory of him and of his achievements will always remain a cherished inspiration.

ernment declared the country free of infection and on December 1 the Board's representative was withdrawn. The local authorities are continuing operations as a precaution against the re-introduction of infection from Peru.

In Peru. Early in the year 1919 an extensive epidemic of yellow fever broke out in the department of Piura, just across the Ecuadorian border in northern Peru, and in twelve months had spread unchecked over a considerable area. The epidemic numbered more than 3,000 cases, with from 500 to 600 deaths. Mosquito control undertaken by Government in 1920 and carried out under the direction of Dr. Henry R. Carter, of the United States Public Health Service, resulted in the epidemic being promptly suppressed. Dr. Noguchi, of the Rockefeller Institute for Medical Research, visited the region during the outbreak and further confirmed his earlier findings in Guayaquil and Mexico by isolating from the blood of yellow fever patients the Leptospira icteroides.

Before the infection had been stamped out in Piura it had been carried into the department of Lambayeque to the south and was not discovered until it had again spread over a considerable region. Late reports indicate that it is still making headway. In response to invitation by Government the Board has contributed toward

the maintenance of control measures which are now being organized by Dr. Henry Hanson under the National Department of Health.

In Mexico and Central America. Merida, Yucatan, has been regarded for years as an important endemic focus of yellow fever. Authorities have been disposed to refer to it as the seedbed from which the infection has been carried from time to time throughout Mexico and Central America. From some source outbreaks have occurred during the last two years in eastern and western Mexico, Guatemala, Honduras, Nicaragua, and Salvador. Operations covering this entire region are now being carried out under unified administration. In each of these countries Government has created under its national department of health a yellow fever commission. By executive decree these commissions have been given full authority to deal with the situation. The simple device of giving the Board representation on each of the commissions has effected concert of effort. Recent reports indicate a steadily falling mosquito index and a corresponding drop in case reports. In view of the vast extent of the area to be covered effort is being centered on strategic points, and particularly on Merida as the key to the situation.

Commission to Africa

The objects of the commission to West Africa were two: (1) to determine whether the reported vellow fever in that region is yellow fever; and (2) to ascertain, if the presence of yellow fever should be confirmed, whether control measures were feasible. The commission sailed from London June 30; visited the Belgian Congo, Dahomey, Gold Coast, Northern Nigeria, Senegal, Sierra Leone, and Southern Nigeria; and submitted its report in New York December 2. No authentic case of yellow fever was seen. Conferences and a study of records, however, gave strong indication of the presence of the infection within recent years. The region of suspected infection is vast, travel is difficult, and living conditions are extremely primitive. And to these must be added the deeply rooted native tradition to conceal all cases of sickness. The control of yellow fever, however, even under these trying conditions, is regarded as not altogether impracticable. The commission recommends that the report be accepted merely as a progress report and that another commission be sent out, equipped for a more extensive and prolonged investigation of the situation, including a laboratory study of the suspected fevers of the region.

Yellow Fever Vaccine and Serum

Killed cultures of Leptospira icteroides were first prepared and used by Noguchi for protective inoculation against yellow fever in Guayaquil in 1918, with suggestive results. The vaccine has been used on a considerable scale in Mexico and Central America with results which seem to support the earlier indications. A therapeutic serum prepared by Noguchi is also available for the treatment of yellow fever. The use of this serum given in the early days of the disease in a limited number of cases seemed to reduce the usual yellow fever mortality of 50 to 60 per cent to 9 per cent. These products are being supplied to government authorities in Mexico, the Central American countries, Peru, and Brazil. It is to be borne in mind, nevertheless, that the vaccine, however valuable as a protection to the individual, is not a substitute for thoroughgoing mosquito control.

Crusade Against Tuberculosis in France

In 1917 the Board joined forces with Government and the people of France in a national crusade against tuberculosis. For three years the French had borne the brunt of war; the tuberculosis rate was supposed to be high and to be on



Fig. 13.—History taking in clinic work. Campaign against tuberculosis. France

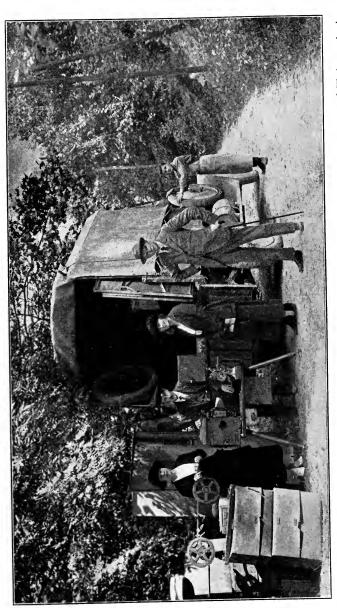


Fig. 14.—Traveling unit used by Educational Division, Commission for Prevention of Tuberculosis in France

the increase; there were in the country but twenty-two tuberculosis dispensaries, and for tubercular cases, military and civilian, not more than 8,000 beds. The situation as viewed by the authorities called for energetic measures.

After conference with French officials and a study of the situation on the ground, operations

were organized under a Commission for the Prevention of Tuberculosis in France. The Commission, working at all times in co-operation with the French and with steadily increasing French personnel, undertook encourage the establishment of tuberculosis dispensaries; to develop centers for the training of visiting nurses; to provide graduate instruction for physicians to

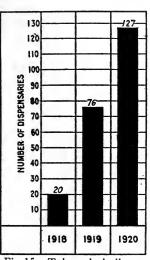


Fig. 15.—Tuberculosis dispensaries functioning in France through initiative of Bureau of Departmental Organization, 1918-1920

prepare them for medical service in connection with the dispensaries; to conduct an energetic educational campaign on a national scale; and to focus all activities in two concrete demonstrations—one comprising a typical congested city arrondissement in Paris, the other the rural de-

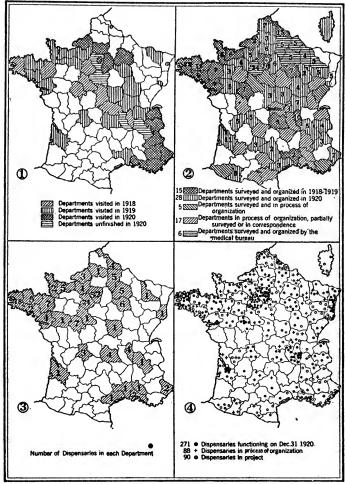


Fig. 16.—Organization and activities of Commission for the Prevention of Tuberculosis in France. 1. Work of educational division, showing departments visited by travelling exhibits during 1918, 1919, and 1920; 2. Work of division of departmental organization, showing departments in which anti-tuberculosis organization has been effected or is in progress; 3. Number of tuberculosis dispensaries in each department co-operating with the Commission on December 31, 1920; 4. Total number of tuberculosis dispensaries functioning, in process of organization, or in project at the end of 1920

partment of Eure-et-Loir. Mobile educational exhibits have covered systematically twentyeight departments; departmental organization, including dispensaries and provision of hospital beds, has been completed in twenty-one departments; seven centers are in operation for the training of public health visitors, and plans have been matured for the establishment of threepossibly four—permanent training schools; diplomas have been granted to 215 women completing the course. The short courses for physicians have been successful beyond expectations. A sustaining popular sentiment has been created, and Government agencies, national and local, are committed to the task. The National Committee of Defense against Tuberculosis has been organized for the ultimate direction of the work. Present plans provide for completion of the transfer of responsibility to French agencies by the end of 1922.

Team-Play in Malaria Control

A series of field experiments conducted in a group of small towns in southwestern Arkansas during the years 1916-1919 had yielded encouraging results. Similar measures had been applied by the Federal Government in the cantonment zones and a number of small communities in

many parts of the South. It had been shown that in towns—even small towns of 1,000 to 1,500 inhabitants—under average conditions in the Southern States, malaria can be controlled

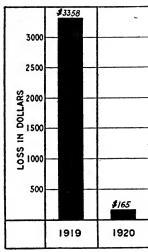


Fig.17.—Results of malaria work measured in terms of dollars. Comparison of losses due to doctors' bills, medicine, and wages sustained by one Tennessee town during 1919 and 1920, respectively. Eightyseven families reported cases of malaria in 1919; only sixteen in 1920. Anti-mosquito measures conducted during 1920 cost the town a total of only \$1,847.75.

within limits of which such communities may well afford. Conditions seemed to invite a joint undertaking on a larger scale with a view to driving this fact home to the people throughout the more heavily infected region. Early in the year 1920 the United States Public Health Service. the state departments of health, and the Board entered into an arrangement by which demonstrations in malaria control were carried out in fifty-two towns in ten Southern States. The local com-

munities provided a liberal share of maintenance costs. Effort was centered on the breeding places of mosquitoes. The measures employed were simple drainage, filling borrow pits and shallow pools, channeling streams, clear-

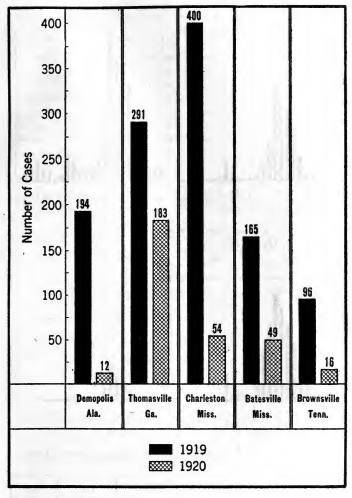


Fig. 18.—Reduction in cases of malaria in five Southern towns where anti-mosquito operations were conducted in 1920 (figures based on physicians' cases). Work was conducted in fifty-two towns, but comparative records of malaria incidence for 1919 and 1920 are not available for all. (See also Fig. 19.)

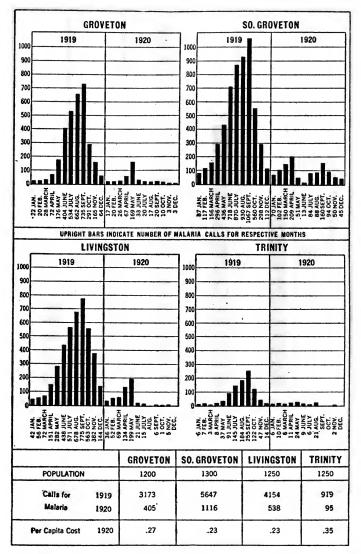


Fig. 19.—Malaria control by anti-mosquito measures in four Texas towns (based on physicians' calls for 1919 and 1920). Control effort began April 1, 1920. (See also Fig. 18.)

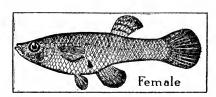
ing the margins of streams and ponds, removing obstructions, turning in the sunlight, oiling, and enlisting the services of the top minnow. Typical results are exhibited in Figs. 18 and 19. The average per capita cost for the fifty-two towns was 78¢ per annum. The records show that such communities having a reasonably heavy infection may free themselves of malaria and of the mosquito as a pest for less than malaria is costing in doctors' bills alone.

Mosquito Control in a Rural Community

Malaria, however, is a rural disease also. In most infected regions it bears with greatest severity upon the people who cultivate the soil. In 1918 the Board undertook a three-year experiment to test the feasibility of mosquito control in a typical community of scattered farm homes. The area selected was in Hinds county, Mississippi. After one year devoted to a study of the field, a systematic attack was made on the breeding places within one fourth mile of each home. Oil and the top minnow were the principal weapons employed. The results were a further demonstration of the efficiency of the top minnow and a reduction of 77 per cent in malaria incidence at a per capita cost of \$2.60 for 1919 and of \$3.09 for 1920.

Fighting Mosquitoes With Fish

The outstanding feature of the experiment in Hinds county was the use of the top minnow (Gambusia affinis) as principal agent in the control of Anopheles breeding. The fish were procured from a large pond within the community;



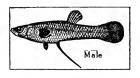


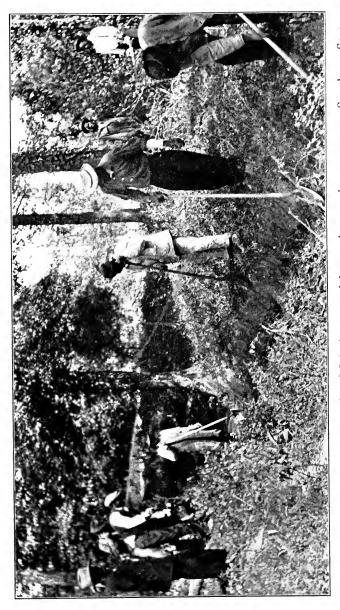
Fig. 20.—Top minnows (Gambusia affinis); actual size. These fish reduce the incidence of malaria in control areas by devouring mosquito larvae, which are their favored food

they were easily transported, multiplied rapidly, wintered well, and were tremendously effective in devouring mosquito eggs and larvae. Wherever conditions favored their use, they demonstrated important advantages over oil: the original cost repre-

sented only the slight labor of transportation; they were relatively permanent, only a few places requiring occasional re-stocking; they were unaffected by rain or wind; and were effective in many breeding places, as in stock ponds and certain running-streams, where oil could not be applied. In 89 per cent of the water deposits within the area in 1919, and in 85 per cent in



Fig. 21.—Type of ditch to carry off drain water and prevent mosquito breeding. Malaria control operations, Southern States



Malaria control by anti-mosquito measures, Southern States Fig. 22.—Ditching gang at work.

1920, mosquito breeding was kept under complete control by the use of the top minnow alone.

Fish were enlisted in 1920 in the fight against malaria in towns. At Canton, Mississippi, the top minnow effected complete control in 86 per

cent of the breeding places; at Athens, Texas, 70 per cent reduction in malaria incidence was achieved through the use of fish alone. Dr. Connor used fish as an important agent in freeing Guayaquil of yellow fever: Le Prince of the United States Public Health Service, demonstrated their effectiveness in Tampico; and they are now being enlisted in the war on

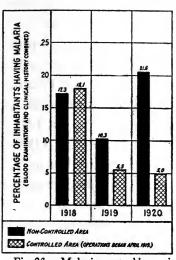


Fig. 23.—Malaria control by antimosquito measures, Hinds county, Mississippi, 1919 and 1920. Rate of clinical malaria in controlled area compared with that in non-controlled area. (Note decline of malarial incidence in controlled area despite fluctuation in non-controlled area)

yellow fever throughout the infected region in Mexico, Central America, and Peru.

Malaria Control by the Use of Quinine

Theoretically it should be possible to prevent the spread of malaria by an attack on the para-

site in the blood of the human host. Every mosquito that carries malaria has derived its infection from the blood of an infected person. If the blood of all infected persons in a community were freed of the parasite, malaria should disappear. By field experiment on a large scale Dr. C. C. Bass has shown that in the Mississippi delta, ten grains of quinine a day for eight weeks kills the parasites in the blood of about 90 per cent of the cases treated. Effort has been made to apply the principle in a selected area in Sunflower county. In 1918 the area, comprising 100 square miles and 9,000 inhabitants, was worked intensively by house-to-house visit. All persons shown by blood examination to be infected, and those giving a history of an attack of malaria within twelve months, were given the standard treatment. Quinine was furnished free. During 1919 and 1920 the drug was provided in convenient form at cost. To plantation managers, physicians, and the people living within the area, reduction in malaria incidence has been obvious. It has been difficult, however, to get a definite statistical measurement of results. By the best estimate available the malaria incidence has been lowered from 40 per cent in 1917 to 18 per cent in 1920. The per capita cost has been: for 1918, \$1.08; for 1919, \$1.09; and for 1920, \$0.38.

The treatment employed by Bass in this field experiment has been endorsed by the United States Public Health Service and the National Malaria Committee, and is being adopted by physicians in their practice. Arrangements have recently been made whereby a commercial agency will supply quinine put up in standard treatment form to stores throughout all malarious communities of the Southern States where the sale of the drug is encouraged by state and local health authorities. This arrangement, by enabling persons desiring quinine treatment to secure it at stores for about half the usual price, will make it unnecessary for health agencies to provide funds for quinine distribution.

Promoting Public Health Through Hookworm Control

Hookworm is one of the most serious of the disabling diseases of man. It is not for this reason, however, that the Board has selected it for so large a share in its scheme of operations. Its control, easily justifiable on its own account, is much more important as a means to a larger end. The disease lends itself readily to purposes of demonstration. It affects fundamentally the welfare of mankind over vast regions, and yet in its cause, its cure, its mode of transmission and means of prevention, it is so

simple and tangible that the layman—even the illiterate—may be made to see and understand it. Demonstrations in the control of this one disease, while bringing relief to hundreds of thousands of suffering people and increasing the economic efficiency of communities and countries, are having a more important effect in creating a popular interest in public health and in promoting the development of permanent agencies for the control of this and other preventable diseases.

With this object in view, control operations were continued or undertaken during the year in nine Southern States and twenty-five foreign states and countries; and infection surveys were carried out in whole or in part in Madras presidency, India; in the islands of Porto Rico, Santo Domingo, and Mauritius; in Colombia; in limited areas of South Australia, Victoria, Tasmania, Northern Territory, New South Wales, and Queensland, Australia; and in the states of Bahia, Pernambuco, Maranhão, Santa Catharina, and Rio Grande do Sul, Brazil.

¹Southern States: Alabama, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia; West Indies: Jamaica, Porto Rico, St. Lucia, and Trinidad; Central America: Costa Rica, Guatemala, Nicaragua, Panama, and Salvador; South America: the Federal District and the states of Bahia, Maranhão, Minas Geraes, Paraná, Pernambuco, Rio de Janeiro, Rio Grande do Sul, São Paulo, and Santa Catharina in Brazil; and Colombia; The East: Ceylon, Papua, Queensland, Seychelles, and Siam.

Nearing the Goal in the Southern States

Operations in the Southern States for the past ten years illustrate the principle above set forth. In 1910-1911 the Rockefeller Sanitary Commission entered into joint arrangement with eleven states for the relief and control of hookworm disease. Five years later the unfinished labors of the Commission were taken over by the International Health Board and have been continued to the present. The time has now arrived when one may say the object which the Commission had in mind has been accomplished, and the arrangement, so far as this disease is concerned, may be brought to a satisfactory close.

These states have not been freed of hookworm. Far from it. The accomplishment of that result, it was understood and stated in the beginning, is a thing that no outside commission could do if it would and that no such organization should do if it could. This is a work for permanent agencies operating over long periods of time. Nevertheless, the object which the Commission set out to accomplish has been achieved. The disease has been greatly reduced in both severity and prevalence; the people have been enlightened as to its importance, its relief, and the means of its final control; permanent agencies rooted in the soil are committed to the task; and

a sustaining public sentiment has been created in the interest of more general measures for the better protection of health. Legislative appropriations for public health purposes have increased during the ten years more than 500 per

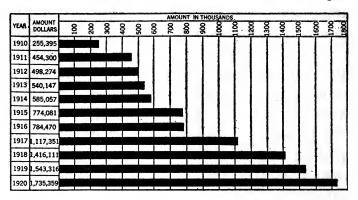


Fig. 24.—Appropriations of legislatures to State Boards of Health in eleven Southern States. 1910-1920. Funds for anti-tuberculosis work included

cent. Full-time county organization is being rapidly developed and measures against hookworm are being absorbed in more general schemes of disease control. In short, the foundation has been laid in these states for a tax-supported health service, state and local, which may be depended upon in the end for the control of hookworm and other preventable diseases.

Comradeship with the states in this service has been an inspiring privilege. Withdrawal from participation in measures directed specifically against this one disease does not terminate or

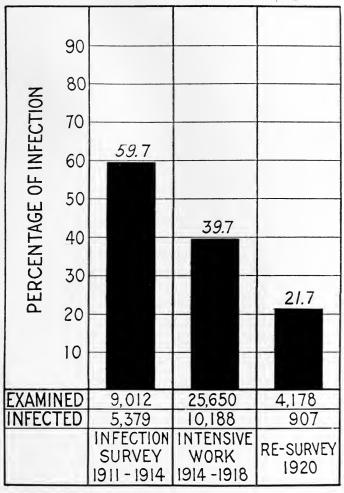


Fig. 25.—Decline in hookworm incidence among school children in Southern States during ten-year period, 1911 to 1920. Based on examination of 38,840 cases in twelve counties

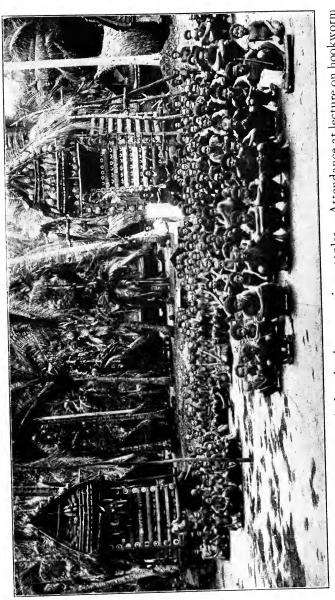


Fig. 26.—Carrying the gospel of sanitation to native peoples. Attendance at lecture on hookworm disease. Village of Gamilababa, Trobriand Islands, Papua

disturb this relationship. It makes possible rather the transfer of effort to what have come to be the more strategic points in the general scheme of development. These are for the

present malaria control, the county health service, and the training of personnel for the services that are being created.

Resuming Operations in the West Indies

During the war it became necessary on account of shortage in personnel to discontinue active measures against hookworm in three colonies of this group. Operations

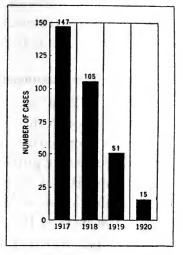


Fig. 27.—Decline in cases of typhoid fever, Monroe county, Mississippi, 1917 to 1920. Measures against typhoid fever constitute an important feature of county health work

are now in progress in Trinidad, St. Lucia, Jamaica, and Porto Rico, with preparations under way for re-opening the work in Dutch Guiana, British Guiana, and Grenada. In all these countries government has undertaken to establish and maintain a system of soil sanitation well in advance of the mobile clinics which follow with an organized scheme of in-

tensive treatment and education. The outstanding features of recent development have been a slow but steady growth in Government support; conspicuous advance, particularly in Trinidad and Jamaica, in sanitation; and an appreciable movement in the direction of a more general scheme of public health.

Government Assuming the Burden in Brazil

In Brazil official agencies are taking over the burden of hookworm control and are going forward with great energy in the development of a general program of public health. In the autumn of 1916 operations were opened in this country with an infection survey followed by a demonstration in the state of Rio. After this first demonstration, for which the Board provided the funds, the service was rapidly extended on the basis of increasing government support to the Federal District and nine states. Response on the part of officials and the people has been hearty. Within four years the influence of the work has reached the entire populated area of the country. The prevalence and menace of the disease have been demonstrated; the people have been interested and instructed; an awakened public sentiment has multiplied appropriations for public health purposes many fold; Federal and state departments of health with en-

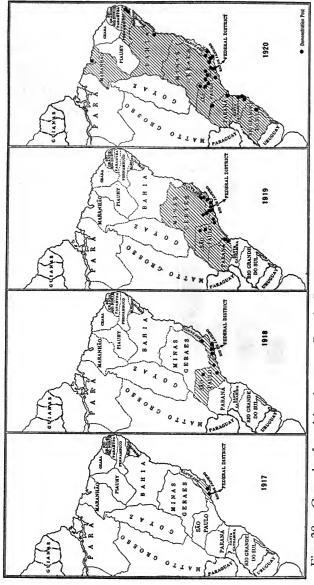


Fig. 28.—Growth of anti-hookworm effort in Brazil. States conducting work and posts maintained, 1917-1920

larged powers and increased resources have united in a national scheme of rural sanitation in which hookworm disease and malaria are given first place. A heartening example of government team-play! In addition to sharing in the scheme of rural sanitation on an equal basis with the states, the Federal service—recently ex-

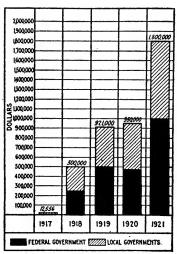


Fig. 29.—Increase in funds appropriated for rural sanitation by Federal and local governments in Brazil, 1917-1921

panded into a national department of health under the energetic leadership of Dr. Carlos Chagas—is organizing for the Federal District special services for venereal diseases and tuberculosis. A part of the plan is to be a training center for visiting nurses in Rio de Janeiro.

Here, as in the Southern States, the time has arrived for

gradually releasing funds that have been devoted to demonstrations in the control of one disease in order to apply them in ways that may serve the cause to best advantage under present conditions. It is recognized that among the more important immediate needs in the

further development of effective service in Brazil are: the introduction of the trained visiting nurse; county organization as an integral part of the state system; and at least one institution adequately equipped to provide training for the personnel needed to meet the require-

ments of this almost unprecedented expansion in public health resources and activities.

Progress in Central America

The Central American republics are small and their resources are limited. Measures against hookworm disease were undertaken in these countries in 1914 and 1915 with little expectation of

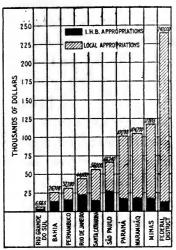


Fig. 30.—Funds available for hookworm work in Brazil, 1920, by states

rapid development in general sanitation. Expectations are being exceeded. In Guatemala under the new government the public health service has been reorganized and provided with larger resources; by executive decree latrine construction has been made obligatory; and fellowships are being provided for the better training of personnel. In Salvador preventive measures

are in progress in twelve of the fourteen departments; Government has reorganized the national health service; is laying the foundation of a diagnostic laboratory service; and has made available for the year about \$97,000 for public health purposes. In Nicaragua considerable progress is being made in soil sanitation; Government is establishing a national department of health and is asking the Board's counsel in its organization; and a fellowship has been provided as a first step in the training of men for this service. In Panama a permanent sanitary staff is being slowly but steadily developed; and Government has more than doubled its annual appropriation for the work.

In Costa Rica the first stage of the work has been completed. The country has been systematically covered; Government has steadily increased its support and has created a national department of health with a special division for the control of hookworm disease. According to present plans entire responsibility for the support and administration of the work is to be transferred to national authorities, and the Board's representative is to be withdrawn by the end of July, 1921. A limited number of fellowships are to be provided for the training of Costa Rican physicians for the new Government service.

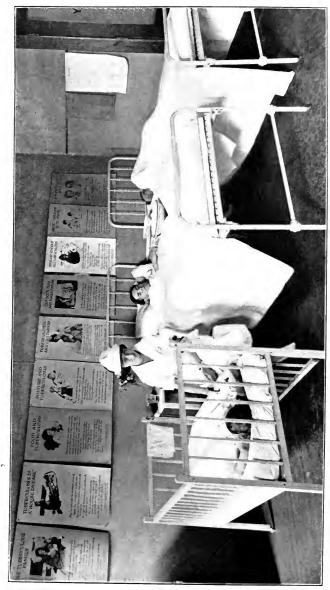
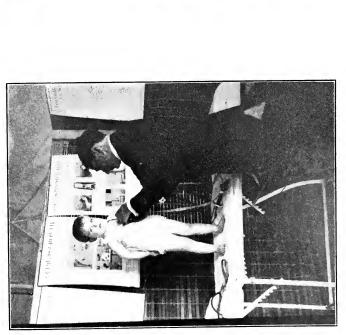


Fig. 31.—Tuberculosis patients cared for by public health clinic. One feature of county health work. Grenada county, Mississippi





First Demonstration in Colombia

The first demonstration in measures against hookworm disease in Colombia was opened with official ceremonies in June, 1920. A survey carried out during the previous year had suggested an average infection of about 75 per cent for the entire population. It is estimated that there are in the country approximately 3,250,000 infected persons, more than 300,000 of whom have been rendered non-productive by this one preventable disease. Officials, planters, and the people are keenly interested and have given active support. Government has pushed soil sanitation far in advance of the mobile clinics and within six months has increased its taxsupported sanitary staff from eleven to eightyfive. One hears talk of a ministry of health. In the meantime the Board is providing fellowships in public health for a limited number of promising young Colombian physicians.

Promoting Sanitation in the Far East

Hookworm control as a means to public health is making progress in the Far East. Notable developments in Australia are reported in a separate section. India, with its population of more than 300,000,000, suffers the handicap of an extremely heavy infection and for years has served as an endemic focus from which, through

the emigration of labor, the disease has been carried to many lands. It is among the Tamil coolies imported from South India that the heavier infection is found today in Ceylon, the Federated Malay States, Fiji, Natal, British Guiana, and some of the West Indies. The first systematic attack on the disease at this important source was made by Lieut. Col. Clayton Lane, of the Indian Medical Service, in 1916 on the tea estates of Assam. In response to official request the Board sent a representative during the year to direct operations in Madras presidency, and it has under consideration a similar proposal from Bengal. The island of Mauritius has been surveyed preparatory to an active campaign. In Fiji Government is undertaking advance soil sanitation in preparation for a revival of the field clinics which were suspended during the war. In Ceylon the clinics, having completed for the time being their work on the rubber and tea estates, have been transferred to the low-country villages for a series of demonstrations among the native Singhalese. By joint action of Government and planters, sanitation on the estates is being continued but on most of them has not yet reached a satisfactory standard. In the Seychelles Government has undertaken a thoroughgoing demonstration in hookworm control. The islands have been covered by a systematic campaign of treatment and education, sanitation is being continued under official inspectors, and as shown by re-survey carried out during the year a marked reduction in the infection rate has been accomplished. In Siam, with strong Government backing and energetic Red Cross participation, the field clinics are treating more than 1,000 persons per week. Soil sanitation is making perceptible progress, though under extreme difficulties, and an active educational propaganda is driving home over a wide region the lessons the clinics are teaching. Government has recently expressed a desire to have the work, which hitherto has been confined to northern Siam, made national in scope. This move makes acute the need of a modern medical school in Bangkok for the adequate training of Siamese physicians.

Creating a Ministry of Health in Australia

Australia has shown its usual enterprise in taking advantage of the presence of a relatively light hookworm infection in a limited region for the promotion of a Commonwealth scheme of public health. The movement began in 1917 with an infection survey of Papua. A survey and demonstration in Queensland the following year led to an undertaking on a national scale in which the Federal quarantine service and the

states united. For two years under this joint arrangement the country has had a demonstration in effective team-play. Officials, physicians, and the people have given support; measures for the control of hookworm disease are being expanded into a more comprehensive plan of rural sanitation; and the new service is being extended to the states, to Papua, and to the territory formerly known as German New Guinea. And now comes report of a step of far-reaching importance. To meet its share of the increasing responsibility the Commonwealth government has created a ministry of health. Under the energetic leadership of Dr. J. H. L. Cumpston, formerly head of the Federal quarantine service, no time is being lost in its organization. In response to request the Board has undertaken to lend to the new ministry during the early stages of its development the services of Dr. Sawyerits present representative in the country,—of an industrial hygienist, and of a sanitary engineer; to assist in the maturing of plans for a public health laboratory service; and to provide a limited number of fellowships for the training of Australian personnel.

Field Studies

The Board has not entered the field of research as such; it is engaged primarily in promoting



Fig. 33.—Czechoslovakian commission just before sailing to make a tour of medical centers in England and the United States. Left to right, standing: Dr. Vacek, Dr. Halik, Dr. Bazika, Dr. Hovorka (secretary to Minister of Public Health), Dr. Petrik. Left to right, sitting: Mr. Kolinsky, Col. Russell, Dr. Prochazka (Minister of Public Health), Prof. Gunn. (Col. Russell and Prof. Gunn were not members of the commission)

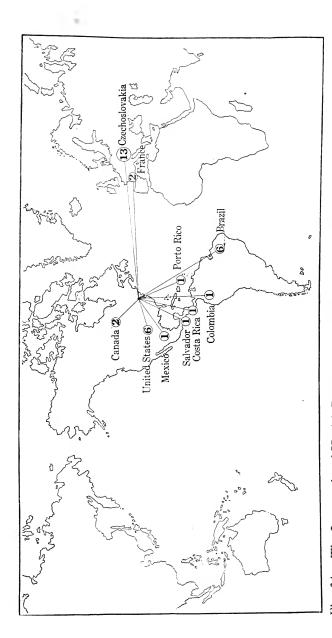


Fig. 34.—The International Health Board has provided thirty-four fellowships for advanced training in public health. The map indicates the countries from which the students have come

the more effective use of the knowledge which we have in the control of disease. It does aid in developing schools of hygiene which are expected to add to knowledge, and it contributes directly to research when in need of an answer to questions arising from its practical field work. During the year field studies have been conducted concerning hookworm infection; treatment of hookworm disease; technique of stool examination; fish as a factor in mosquito control; and effect on malaria incidence of screening, killing mosquitoes in dwellings, and impounding water in bayous. Members of the field staff have assisted Dr. Noguchi of the Rockefeller Institute in the further testing of his yellow fever vaccine and serum. Results of the studies in the treatment of hookworm disease carried out by Dr. Darling and Dr. Smillie in Brazil are being put to practical test in a number of field clinics in that country, with indications of a very considerable gain in speed and economy of operation.

Public Health Laboratory Service

The laboratory and reliable vital statistics are the necessary basis of intelligent public health administration. In response to repeated requests for counsel the Board has made provision, in the appointment of Colonel F. F. Russell

of the Army Medical Service to membership on its staff, for giving aid to governments in organizing or further developing their public health laboratory service. He has given such assistance during the year to Alabama, Mississippi, Kansas, and Czechoslovakia.

Creating a Health Service in Czechoslovakia

Under the Empire the administration of public health for the areas now constituting Czechoslovakia was centered in Vienna and Budapest. The present Government is confronted with the task of creating a new service and training a staff to administer it. By invitation two representatives of the Board visited Prague in February for conference with Government authorities and a preliminary study of conditions. Proposals matured at that time and approved by the Board at its meeting in May are now in operation. The Board has a representative at Prague placing American experience at the service of the ministry and interpreting Czech conditions and experience to the home office; as guests of the Board a group of officials representing the ministry have visited England and the United States to study public health administration; thirteen fellowships in public health have been provided for young Czech physicians in training

for the service being developed at home; and during the autumn the Board's laboratory specialist visited the country and assisted in maturing plans for a national public health laboratory service. The plans provide for a laboratory at Prague, with branch laboratories, as the service requires, at suitable points throughout the country. The scheme will center in an institute of public health with seven divisions: providing for anti-rabic vaccinations; production of smallpox vaccine; production of sera; food inspection; drug inspection; diagnostic laboratory; and courses for the training of public health workers. It is to be under the ministry of health and on the side of instruction is to be intimately related to the University Medical School. Government has appropriated for public health purposes for the year 1921, 81,891,717 crowns.

Institutes of Hygiene and Training in Public Health

The key to permanent progress is in the development of the science of hygiene and the training of men for practical public health administration. There is opportunity at the present time for important work by a limited number of institutions with adequate resources that shall undertake to cover broadly the field

of hygiene and public health, and to combine with the work of instruction and of practical training the cultivation of the fundamental sciences. In addition to these there will be more abundant facilities in the form of short intensive courses for the continued improvement of the workers in the service. The Johns Hopkins School of Hygiene and Public Health enrolled during the year one hundred students, of whom twenty-nine took the short course. Proposals have been submitted for the development of schools of public health at Prague and at São Paulo, Brazil. The Board contributed toward the maintenance of a health officers' institute or short course in Georgia; and plans are being matured for a similar institute for visiting nurses in the state of New York. The Board provided during the year thirty-four fellowships in public health for selected physicians from ten countries: Mexico, Salvador, Costa Rica, Porto Rico, Colombia, Brazil, France, Czechoslovakia, Canada, and the United States.

Publications

The following is a complete list of the reports and publications issued by the International Health Board during the year 1920:

PRINTED REPORTS (for general distribution)

Annual Report for the Year 1919.

Hookworm and Malaria Research in Malaya, Java, and the Fiji Islands (Report of Uncinariasis Commission to the Orient, 1915-1917). By S. T. Darling, M.D., M. A. Barber, Ph.D., H. P. Hacker, M.D.

LITHOGRAPHED REPORTS (for limited distribution)

Annual Reports for 1919 on Work for the Relief and Control of Hookworm Disease in the following countries:

West Indies

British Guiana	Dr. F. W. Dershimer
Jamaica	Dr. P. B. Gardner
St. Lucia	Dr. Stanley Branch
Trinidad	Dr. G. C. Payne

Central America

Costa Rica	Dr. Louis Schapiro
Guatemala	Dr. W. T. Burres
Nicaragua	Dr. D. M. Molloy
Panama	Dr. F. A. Miller
Salvador	Dr. C. A. Bailey

South America

Brazil	1)- 1	V. Hackett

The East

Ceylon	Dr. W. P. Norris
Queensland	Dr. W. A. Sawyer
Seychelles	Dr. J. F. Kendrick
Siam	Dr. M. E. Barnes

Report on Hookworm Infection Survey and Malaria Survey of Porto Rico from December 26, 1919, to January 28, 1920—Dr. J. B. Grant.

Report on Use of Top Minnow (Gambusia affinis) as an Agent in Mosquito Control—Dr. H. H. Howard.

Articles and Reprints

The following is a list of other contributions to medical and public health literature which were made during the year, most of them in the form of articles published in medical journals that are widely circulated among persons interested in medical and public health topics:

Dr. C. C. Bass

Attempt to explain the greater pathogenicity of Plasmodium falciparum as compared with other species. Journal of Tropical Medicine and Hygiene, Oct. 1, 1920, v. 23, p. 237-238.

Campaign against malaria: malaria, how to get rid of it. Mississippi State Board of Health. *Health Bulletin*, Oct.-Dec., 1920, v. 8, p. 1-2. Same reprinted.

Responsibility of physicians who treat malaria cases. Southern Medical Journal, Oct., 1920, v. 13, p. 693-695.

Studies on malaria control:

No. 10. Cure of infected persons as a factor in malaria control. American Journal of Public Health, Mar., 1920, v. 10, p. 216-221. Same reprinted.

No. 11. Control of malaria by quinine sterilization of the human host. Southern Medical Journal, Apr., 1920, v. 13, p. 250-256. Same reprinted.

Dr. M. E. Connor

Yellow fever control in Ecuador; preliminary report. Journal of the American Medical Association, Mar. 6, 1920, v. 74, p. 650-651. Same reprinted. Spanish trans. in Journal of the American Medical Association (Spanish edition), Apr. 1, 1920, v. 3, p. 456-458. Same reprinted.

Yellow fever in Ecuador; final report. Journal of the American Medical Association, Oct. 30, 1920, v. 75, p. 1184-1187. Same reprinted.

Dr. S. T. Darling

Experimental inoculation of malaria by means of Anopheles ludlowi. *Journal of Experimental Medicine*, Sept. 1, 1920, v. 32, p. 313-329. Same reprinted.

Observations on the geographical and ethnological distribution of hookworms. *Parasitology*, Sept., 1920, v. 12, p. 217-233. Same reprinted.

Suggestions for the mass treatment of hookworm infection. Lancet, July 10, 1920, v. 2, p. 69-72. Same reprinted.

Dr. S. T. Darling & Dr. W. G. Smillie

Teaching of vital statistics to medical students in Brazil. Journal of the American Medical Association, July 31, 1920, v. 75, p. 337-339. Same reprinted. Dr. J. A. FERRELL

Results of recent efforts to control malaria. Southern Medical Journal, Apr., 1920, v. 13, p. 256-260. Same reprinted.

Rôle of the latrine in the control of hookworm disease. American Journal of Public Health, Feb., 1920, v. 10, p. 138-140. Same reprinted.

Compensation of health officers. American Journal of Public Health, July, 1920, v. 10, p. 569-575. Same reprinted.

Dr. W. C. Gorgas, Dr. H. R. Carter, & Dr. T. C. Lyster Yellow fever; its distribution and control in 1920. Southern Medical Journal, Dec., 1920, v. 13, p. 873-880. Same reprinted.

Dr. Juan Guiteras
Observations on yellow fever in Martinique. Sanidad y
Beneficencia, Havana, Apr.-June, 1920, v. 23, p. 232-236.

Dr. L. W. Hackett O problema da uncinariose (The hookworm problem). *Brazil-Medico*, Rio de Janeiro, July 31, 1920, v. 34, p. 497.

Dr. H. H. Howard

Malaria control in communities by anti-mosquito measures.

Mississippi State Board of Health. *Health Bulletin*, Oct.-Dec., 1920, v. 8, p. 2-5. Same reprinted.

Malaria control in rural communities by anti-mosquito measures. Southern Medical Journal, Apr., 1920, v. 13, p. 260-266. Same reprinted.

E. C. MEYER

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APPENDIX

30

ACKNOWLEDGMENT

Extensive use has been made of the following special articles and reports in compiling the appendix, particularly the sections dealing with hookworm disease and county health work:

"Studies on Hookworm Infection in Brazil," by S. T. Darling and W. G. Smillie; published as monographs of the Rockefeller Institute for Medical Research, New York City, 1921.

"Studies in Relation to the Technique of Field

Campaigns," by W. G. Smillie.

"Co-operative County Health Work in North Carolina," by B. E. Washburn; published as health bulletin of North Carolina State Board of Health, Raleigh, N. C., January, 1920.

In certain instances the authors' own words have been used. The Board is indebted to these as well as to many other members of the staff for contributions in the form of reports and articles which have made possible the following statement of findings and results.

APPENDIX

I

EXTENT AND SEVERITY OF HOOKWORM DISEASE¹

During 1920 hookworm infection surveys were conducted in sixteen areas.² In these areas the incidence as indicated by microscopic examination of feces ranged from the complete absence of infection

recorded in four Australian states to the almost universal infection recorded in the states of Bahia, Pernambuco, and Maranhão, Brazil. In areas where the rate of infection was high the disease was found to be prevalent even among those who had the means to cure and who protect themselves against it. Thus, in the state of Santa Catharina, in Brazil, 78 per cent infection was recorded among those who could read, 57 per cent among those who claimed to use latrines, and 46 per cent among a group of teachers, doctors, druggists, lawyers, and fazenda or plantation owners.

Distribution of Hookworm Disease in Brazil. Surveys have now been made of all the larger states of the Brazilian littoral except Pará. The gen-

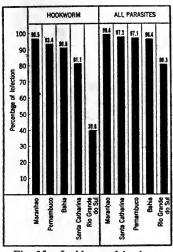


Fig. 35.—Incidence of hookworm and other parasitic infection in five Brazilian states surveyedduring 1920

eral results are indicated on the map, Fig. 36. The southern boundary of Bahia may be taken as the dividing line between an area of severe infection to the north and an area to the south where the infection, although probably still high in rural regions, is on the

¹ Based on 1920 infection surveys.

² The states of Bahia, Pernambuco, Maranhão, Rio Grande do Sul, and Santa Catharina in Brazil; the republic of Colombia; the islands of Porto Rico, Santo Domingo, and Mauritius; the presidency of Madras, India; and the states of Queensland, South Australia, Victoria, Northern Territory, New South Wales, and Tasmania in Australia.

average less intense. This area of less intense infection extends to the southern boundary of São Paulo. Along the coast the incidence remains about 80 per cent to the extreme southern limit of Brazil, although in the southernmost state—Rio Grande do Sul—this condition is confined to a very narrow strip indeed. A lit-

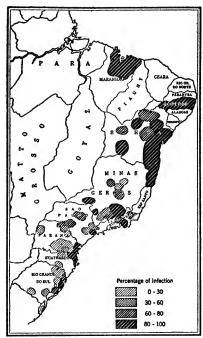


Fig. 36.—Distribution of hookworm infection in Brazil, as indicated by infection surveys. Note extreme high incidence along the coast

tle further inland the incidence drops to 70 per cent, and beyond falls away rather abruptly to nothing.

Infection along the littoral seems to be invariably more severe than further inland. This condition is probably due in the different regions to different combinations of causes, into which enter climate, concentration of population, and prevailing occupations of the rural inhabitants. In northern São Paulo and southern Minas the high incidence of infection seems to be due mainly to intensive agriculture; in Rio and Santa Catharina to particularly favorable conditions of soil, temperature, and moisture. In the three northern states surveved the difference is slight but still apparent (Fig. 36).

There remain along the coast six states of relatively small areas which

have not yet been surveyed. The indications are that two of these—Piauhy and Ceará, which lie between Maranhão and Bahia—will not show the same high incidence of infection as the latter states. Piauhy and Ceará suffer periodically from long-contínued droughts—sometimes a year passes without rain; and this situation in itself would tend to control hookworm infection. Alagoas and Sergipe will probably show the same infection as the bordering states of Pernambuco and Bahia; Parahyba and Rio Grande do Norte may be expected to show a transition from the universal infection of Pernambuco to the less serious situation supposed to exist in Ceará.

In the great interior states of Brazil the population is so sparse that hookworm disease becomes one of the less important problems.

Infection Rate in Colombia. In the infection survey of Colombia, investigation was limited to the department of Cundinamarca. This department includes within its boundaries all the climatic zones into which the country is divided and is believed to be fairly representative of the country at large.

Examination of 8,465 representative persons

from forty-five different districts and all of the zones showed 6,613, or 78.1 per cent, to be harboring hookworms. The incidence was found to vary inversely with the altitude, decreasing rapidly as the

cold zone was approached. The highest rate of infection (88.1 per cent) was found in the provinces of Guaduas and Tequendama; the lowest (9.6 per cent) in Bogotá and Guatavita (Fig. 37).

The survey findings in Cundinamarca showed that the people who lived in districts having an altitude of less than 6,600 feet had an average infection rate of 84.4 per cent. Among those who lived in higher altitudes the average percentage of infection was 20.4 (Fig. 38). By applying these figures to the country as a whole, it was calculated that in a population of 5,072,613 there were as many as 3,320,602 infected persons. Since 10 per cent is a reasonable estimate of the number of hookworm cases

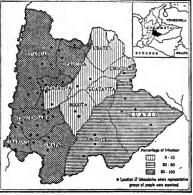


Fig. 37.—Infection survey map of Cundinamarca, Colombia. (Insert shows location of the department in the republic)

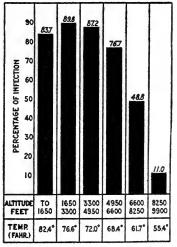


Fig. 38.—Hookworm infection in relation to altitude. Colombia. In zones of less than 6,600 feet elevation, infection was practically universal

that are unable to work, the survey may be taken as indicating that the nation is supporting more than 300,000 persons who have been rendered non-productive by a single preventable disease.

Incidence of Infection in Santo Domingo. An estimate based on the findings of the survey of Santo Domingo places the approximate incidence of infection for the country at about 50 per cent. In the Cibao, the fertile valley lying north of the central mountain range, where live 57 per cent of the total population, the rate of hookworm infection was 67.4 per cent (Fig. 39). This region is not only the most densely and uniformly settled part of the country, but

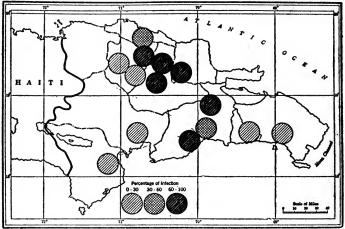


Fig. 39.—Distribution of hookworm disease in Santo Domingo

it presents, with its soil of rich loam and its constantly recurring rainfall, conditions almost ideal for the propagation of hookworm larvae. In the plains south of the mountain range, where dwell an additional 28 per cent of the population—living chiefly along the seacoast—the infection revealed was 43 per cent. Here was found the greatest variation in the incidence of infection; it was heaviest in the vicinity of the capital and lowest in the more sparsely settled sections lying along the southeastern coast. The arid western area, comprising the provinces of Monte Christin Azua and Barahona, with a very sparse population which approximates only 15 per cent of the total for the country, revealed a hookworm incidence of 11.4 per cent.

The clinical results of the infection are not severe, probably because the population is largely of negro blood and the infection is in the main of recent origin. Tests made during the course of the survey showed that the hemoglobin of persons with hookworm disease was not greatly reduced. In 283 infected persons the average hemoglobin was found to be 74.4 per cent, as compared with an average hemoglobin of 79.3 per cent in 221 uninfected persons. Nevertheless, in spite of the fact that the disease has thus far caused little clinical anemia, there is much to indicate that its presence is a serious hygienic and economic problem and likely to become an ever more pressing one as time goes on. The need of controlling it, therefore, stands among the more important specific sanitary problems to be met by the island government.

Hookworm Infection in Mauritius. In Mauritius not less than two of every three among the 2,867 persons examined were

found to be harboring the hookworm parasite. persons examined included all ages, all races, and both sexes, and were chosen indiscriminately over wide areas. The infection rate ranged from 29.4 per cent among residents of the Port Louis district to 100 per cent among those of Moka (Fig. 40). From the survey records it may be conservatively estimated that 226,000 persons in the colony are infected.

The effects of the disease fall most heavily on the East Indian estate laborers, many of whom are extremely weak, anemic, and edematous, and suffer from disturbances of the heart. Persons presenting these symptoms were

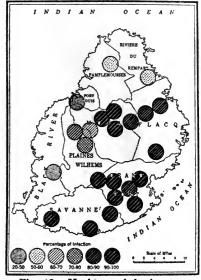


Fig. 40.—Hookworm infection survey map of Mauritius

seen in all parts of the island, but more frequently in the districts with the higher percentages of infection. Districts with much rainfall had consistently higher and more severe types of infection than those with little rainfall, the incidence of infection in wet and dry districts being, respectively, 74.6 and 44.7 per cent (Fig. 41).

Hookworm Survey of Madras Presidency, India. Demonstrations or surveys were conducted during 1920 in the Cannanore jail in Madras presidency, India, on various tea estates, and later in the city of Madras. On the tea estates a total of 2,300 laborers were examined, and the infection rates were found to vary from 83 per

cent among laborers from dry districts to 100 per cent among those from wet districts. Among 964 inmates of the Cannanore jail, a hookworm incidence of 89.7 per cent was found. Prisoners drawn from all but three of the twenty-four districts of the Presidency were included in the number examined. There were very few instances of severe or even moderately severe hookworm disease among the prisoners; among the estate laborers, on the other hand, the propor-

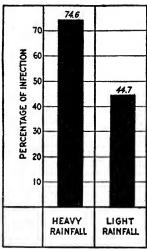


Fig. 41.—Effect of rainfall on hookworm propagation. Comparative incidence of the disease in districts with heavy and with light rainfall. Mauritius

tion of severe cases, as determined by clinical observations as well as by hemoglobin tests, was very large.

The city of Madras was chosen for investigative work in an industrial center. Among urban residents employed in the cotton and silk mills of the city, two of every three persons examined were found to be infected. The rate of 55.7 per cent found among school children, who almost without exception go barefoot, was in sharp contrast with the rate of 15.8 per cent which obtained among teachers, almost all of whom wear shoes.

Hookworm Infection Not Widespread in Australia. The results of the work in Australia up to December 31, 1920, lead to the conclusion that hookworm infection is confined principally to irregular pockets and is not very widespread. The principal factor determining the shape and position of the pockets seems to be rainfall. This has greater influence

upon the extent and severity of infection than have variations in methods of night soil disposal; in some communities of low rainfall hookworm disease has gained no foothold in spite of the grossest carelessness in the disposal of feces.

Relationship between Rainfall and Infection. Surveys conducted during the year in South Australia and Victoria, where rainfall is low and occurs mostly in winter, indicate that hookworm disease is absent from the mines as well as from the surface. Similarly, a survey of the important group of deep mines at Broken Hill, in New South Wales, and another survey begun on a small scale in and around the city of Darwin, in Northern Territory, have disclosed no hookworm infection.

In Papua the infection rate is high, 58.8 per cent of the 18,088 persons examined to date having been found infected. Even in this



Fig. 42.—Worms recovered from nine-year-old boy as result of one treatment with oil of chenopodium. Eightynine hookworms and eighty-one Ascaris. This demonstration induced many to apply for treatment. Brazil



Fig. 43.—Laborers at estate camp in island of Mauritius. One hundred per cent hookworm infection

tropical country, however, there is an area along the southern coast in which rainfall is low and the incidence of hookworm disease is much reduced. Of the areas examined on the continent of Australia, only the state of Queensland has thus far shown a serious hookworm problem; even here, however, the infection is confined to a narrow strip of coastal area. Inland from the coastal ranges the rainfall is low and hookworm disease is rare or absent (Fig. 44.)

Racial Incidence of Infection. Infection by race presents a curious anomaly in Australia. In the few places where the aborig-

ines still live together, they have a much higher infection rate than the white people of the same district. It is only occasionally that a community is found where more than 30 per cent of the whites are infected. Aborigines living under the same conditions are all likely to be infected. In Papua, also, the high infection is almost entirely limited to natives. There are, however, only a few whites living in the latter territory.

SEVERITY OF HOOKWORM DISEASE

Usually, the higher the percentage of persons infected in a given locality, the larger is the average number of worms harbored by infected persons, the more severe are the symptoms, and the more difficult is it to

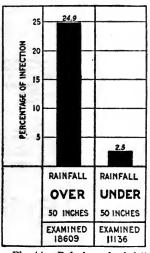


Fig. 44.—Relation of rainfall to hookworm incidence. North Queensland, Australia

bring the disease under control. Rates in the preceding paragraphs relating to the incidence (but not the severity) of the infection are based entirely on the results of search with the microscope for eggs in the feces. The work of Darling and Smillie has shown, however, that the microscope offers no trustworthy index of the number of worms harbored by infected individuals. This information may be accurately ascertained only by giving the persons a vermifuge and counting the worms expelled after the drug has acted. Studies which seek to establish through microscopic examination the relationship of race, sex, age, occupation, and similar factors to the incidence of hookworm infection lose a large part of their value when considered in the light of information revealed by the worm-count method.

Value of Worm-Count Surveys. The fact that the microscope cannot be expected to reveal differences in the amount of the infec-

tion was demonstrated, for instance, in the state of São Paulo, where worm counts showed that male coffee pickers had 350 worms on the average while their wives had only fifty; yet the microscope could do no more than call positive both the husbands and the wives.

Worm counts are scarcely practicable when the incidence or severity of the disease is to be studied over a wide area and within a limited period of time. Nevertheless, it is sometimes feasible to make them as an incidental feature of the work within restricted areas, and this was done in the course of the infection surveys conducted during

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Fig. 45.—Children and old people in rural Brazil suffer more severely than young adults from the effects of hookworm disease. Hemoglobin index in relation to number of hookworms harbored. Distribution by age groups

1920 in the states of Pernambuco and Santa Catharina. Brazil. In Pernambuco from 500 to 800 worms were repeatedly recovered from the feces passed by agricultural laborers during the first few hours after treatment, and in Santa Catharina the worms obtained after treatment with thirtyfive to forty drops of chenopodium ranged from 1 to 1.156. One child of five years expelled 412 hookworms. the latter state, moreover, children from nine to twelve frequently expelled from 100 to 150 Ascaris (Fig. 42).

Correlation between Number of Hookworms and Hemoglobin Index. The hemoglobin index is a very good means for determining, in the case of individuals as well as of groups, the degree of injury that hookworms are producing. Fig. 45 illustrates the relationship between the hemoglobin index

and the number of hookworms as ascertained by Drs. Darling and Smillie in their work in rural Brazil. Seventy-five worms are seen to produce in all groups a definite lowering of the hemoglobin amounting to about four points. As the worms increase in number beyond this figure, the hemoglobin of children and of persons more than forty years of age declines rapidly and continuously until the index of cases with upward of 400 hookworms is more than twenty points below normal.

Persons between fifteen and thirty-nine offer such strong resistance to the disease that even 675 to 700 hookworms cause a decline

in hemoglobin of only ten points. In interpreting these facts, it should be borne in mind, however, that hookworm infection is slowly acquired, that the blood-forming elements of the bone marrow are active, and that the body defenses struggle against the hookworms to retain the normal hemoglobin. In older individuals and in children the body defenses have little endurance, and if hookworm infection is heavy, the battle is a losing one.

Hookworm the Chief Anemia-Producing Factor in Santa Catharina. In a study of 9,482 persons in Santa Catharina hookworm disease was easily incriminated as the chief cause of

anemia. As a single factor in the production of anemia it appeared on the average more potent than malaria, although it produced its severest anemia only when in conjunction with malaria. Regionally and occupationally the infection was correlated with the intensity of anemia. It was evident that of all the groups examined the inhabitants of the coastal plain (90 to 95 per cent infected) suffered most severely from anemia. and chief among them the field workers (94 to 98 per cent infected), who represent one fourth of the population and are the chief producers of wealth. Second in both extent and gravity of anemia were those less than nineteen years of age (90 to 93 per cent infected), and third the housewives (80 to 85 per cent infected).

Hookworm Disease and Malnutrition in Relation to Anemia. In the state of São Paulo, Brazil, however, studies

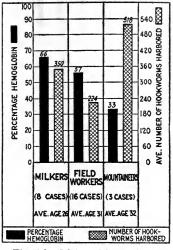


Fig. 46.—Malnutrition and hookworm disease as factors in producing anemia. Comparative study of well nourished and poorly nourished occupational groups. Milkers well fed; field workers moderately well fed; mountaineers poorly nourished. Brazil

of hookworm disease and the food factor in their relation to the production of anemia suggested that malnutrition, especially when it approaches the point of starvation, is more potent even than heavy hookworm infection in reducing the hemoglobin. One of the São Paulo studies was based on worm counts and hemoglobin tests of eight milkers who engaged in field work part of the time, of sixteen laborers who gave all their time to work in the fields, and of three mountaineers. All of these men were heavily infected. The milkers drank

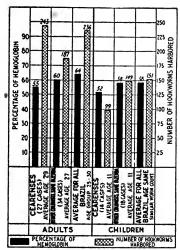


Fig. 47.—Malnutrition and hookworm disease as factors in production of anemia. Resistance to anemia among hookworm infected refugees from famine-stricken district of Ceará compared with that among hookworm infected colonists who had been living on São Paulo plantation for several years

plenty of milk and had other good food; the field workers had good food but no milk; the mountaineers were poor and underfed. Fig. 46 compares the hemoglobin average of the three groups. The milkers were relatively strong and active; the mountaineers were weak and listless.

In another study, forty-one refugees who had migrated to São Paulo from the faminestricken state of Ceará were compared with fifty-two laborers who were native to the state of São Paulo. Both groups at the time they were studied were eating similar food, living under similar conditions, and performing similar tasks in the fields. Both were infected with hookworms. The Paulo laborers, who were accustomed to a comparatively full diet, had, as Fig. 47 indicates, a much higher hemoglobin index than the refugees from Ceará. who had suffered from malnu-

trition. The difference was especially noticeable in the case of children. Those from Ceará harbored only 99 worms, as compared with the average of 149 harbored by those who were native to São Paulo, yet the hemoglobin index of the former group was six points lower than that of the latter.

FIELD STUDIES OF HOOKWORM DISEASE

Drs. Darling and Smillie have conducted in Brazil a number of investigations in which they have sought to throw light upon the varying incidence and severity of hookworm disease in different groups of the population, and the factors which determine this variation. Their studies have been based on the careful counting of worms expelled by infected persons.¹ They have carried out their experiments in their capacities of Director and Associate Director of the Laboratory

of Hygiene at the university of São Paulo, Brazil, and have been assisted in the work by the staff engaged in combating hookworm disease in Brazil.

Direct Contact with Humid Earth Chief Factor in Infection. The studies bearing on the relationship between contact with humid earth and the incidence of infection with hookworm disease demonstrated that under Brazilian conditions hookworm is an occupational disease—a disease of those who work in the soil. The number of worms harbored was found to vary directly with the amount of time the individual spent in bare feet in the fields.

Fig. 48 shows that on fazendas in several different states, adults and children who worked barefoot in the field were

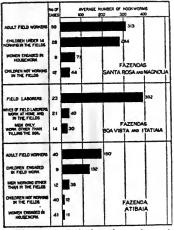


Fig. 48.—Relative intensity of hookworm infection among agricultural laborers and persons engaged in other occupations. 299 cases. Brazil

heavily infected, while those who were engaged about the house harbored but few worms. Almost without exception the more intimate and direct was the contact of these people with the humid earth in which the larvae breed, the more severe was the infection they exhibited.

Contrary to expectation, the average infection of people grouped in villages with little or no sanitation—shopkeepers, barbers, and non-agricultural workers generally—proved to be not so heavy as that of persons living in scattered farmhouses. Even though the

¹ For full discussion of the methods employed, see pages 156 and 157.

soil in and about the villages teems with hookworm larvae, the people themselves are not in actual contact with the soil. Many inhabitants of rural communities, too—persons such as school teachers and plantation owners, who generally live amid good surroundings—showed little infection because their skin did not come in contact with infected soil. Residents of cities with paved streets and latrines were found to be lightly infected unless in recent years they had been workers in the fields.

Slow Acquisition of Hookworm Infection. Theoretically it is possible to acquire massive infection with hookworms following a

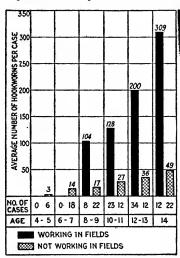


Fig. 49.—Relative intensity of hookworm infection among children working in the fields and those not working in the fields. Classification by two-year age groups. Brazil

single exposure; the field studies in Brazil showed that actually this does not occur. They indicated, on the contrary, that the infection is gradually acquired, a worm here and another there, and that many days and weeks pass without any addition to the number harbored. This fact is well illustrated in Fig. 49, which shows by age groups the increase in the number of hookworms harbored by children. Those who begin work in the fields at eight years have an average infection of about fifteen worms each. Until the fourteenth year this infection increases at the rate of about fifty worms a year, or approximately one a week. Children who do not work in the fields gain only one worm every six weeks, or eight a year.

At ten years of age, less than

half of the children have ten worms each. This means that they have picked up on the average not quite one worm a year. Not a single child of all those examined who were ten years of age or less harbored 150 hookworms. Nevertheless, many of them had been working continuously in the fields and for more than two years had been constantly exposed to the heavily infected soil.

The slow acquisition of the infection was further demonstrated in a group of Japanese colonists engaged in field work in Brazil. Some of them had been working in highly infected soil for about two years, but had only begun to lose the Ancylostomes which they had brought with them from Japan and to acquire the Necators which are common to Brazil. Other Japanese on the same fazenda who had been in

Brazil for more than four years had acquired a large number of Necators, though even by the end of this period they had not acquired so many of the latter species as the average number harbored by native Brazilians who worked side by side with them (Fig. 50). In another instance a woman eighteen years of age who had been a servant in a city home all her life until her marriage to a colonist, when she began to spend some time at work in the field,

had not acquired a single hookworm after four months' service, despite the fact that the soil in which she worked was heavily infected.

Slow Loss of Hookworm Infection. The infection that is gained so slowly is also slowly lost. This was demonstrated by the following instances. A study of a group of people in a village in the state of Rio gave an average of twenty-eight worms among those who did no field work. Two members of this group, a brother and a sister eighteen and twenty-one years of age, respectively, had worked in the fields from childhood until three years previously, when their father moved to the village, became more prosperous, and provided his children with shoes. The brother and the sister then gave up field work and lived under comparatively good hygienic conditions, but when examined still harbored 318 and 233 worms, respectively. The average infection of field workers in the original district was 390 worms.

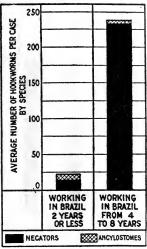


Fig. 50.—Slow acquisition of hookworm infection. It takes Japanese field laborers in Brazil from four to eight years to acquire any considerable number of Necators, the species of hookworm common to the New World

In the same village a servant girl New World of twenty-three years who had left the fields four years previously to work in the kitchen of a wealthy landowner, where she was surrounded by the best sanitary conditions, when examined still harbored 369 worms. Another young woman who, after having worked for years in the fields, had been married three years previously and had since devoted herself to housework, yielded when treated a total of 379 worms.

Effect of Shoes on Infection. Any factor that limits or prevents the contact of bare feet with humid earth should lower the degree of infection. Drs. Darling and Smillie gave attention to the use of shoes as a factor of this kind. In rural Brazil it is almost the universal custom to go barefoot, partly because of the inconvenience which results from wearing shoes and partly because

shoes are so expensive. When working in the field, children never wear them, and adults only rarely.

Groups of adult laborers were studied in three widely scattered localities having conditions practically identical with respect to food, shelter, and type of work. From adult shoe-wearers an average of 27 worms per case was obtained; from barefoot field laborers working side by side with the shoe-wearers, an average of 255 worms per case (Fig. 51). In the family of a Spanish colonist there were

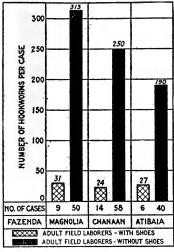


Fig. 51.—Effect of shoes in controlling hookworm infection. Worms harbored by field workers wearing shoes compared with number harbored by those not wearing them. Three coffee plantations in Brazil

six adults who wore in the field a simple, crude, home-made shoe, and four children who went barefoot. From the adults the average number of hookworms obtained was 40; from the children, who should normally have harbored far fewer worms than the adults, 226.

Hookworm a Disease of Young Adults. So far as representative Brazilian areas are concerned, the investigations of Darling and Smillie have shown that hookworm disease is a disease of youths and young adults, particularly males. It makes its most severe attack on persons between fifteen and forty-five years of age-in the productive period of life. Fig. 52 shows that the number of worms harbored by males rapidly increases up to the fifteenth year; there is then a gradual, slow, and steady increase throughout the active

period of life, with finally a break between the ages of forty-five and fifty and a strikingly abrupt diminution after the latter age.

When the field laborer between twenty and forty-five becomes infected with many more than 200 to 300 hookworms—the average for his age period—he becomes unable to spend so many hours in the field as do his less heavily infected fellow-workmen. His enforced absence from the field for a part of the working day lessens his opportunities for acquiring new infection. A certain number of the worms already harbored die off from natural causes and are eliminated. As the worms cannot multiply within the body, the infection then automatically becomes lighter.

Thus the average infection of 200 to 300 hookworms is maintained for twenty years through the economic necessity of earning a living in

the fields, where the laborer acquires infection, and the necessity of resting at home from his labors because of weakness. where he slowly loses infection. For the body-defense forces the battle is a losing one, however; the break in health and strength finally comes between forty-five and fifty years of age. After the latter age the average laborer in Brazil is old and broken, and to preserve his health must give up a large part of his field work and begin to wear shoes regularly.

Comparative Infection among Males and Females. A test which included 562 males and females ranging in age from five to fifty years or more, showed that children under ten

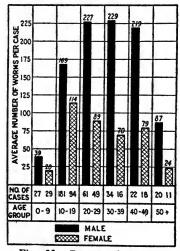


Fig. 53.—Degree of hookworm infection in relation to age and sex. Based on 562 cases. Brazil. Note that females harbor far fewer worms than males

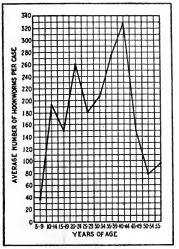


Fig. 52.—Average number of hookworms harbored, by age groups. Based on examination of 381 infected males. Brazil

years of age harbor very few worms, girls a few less than boys. The next decade showed in both sexes a tremendous increase in worm incidence, as it is the period during which the children go to work in the fields. the girls usually taking up the hoe a little later than the boys and working side by side with them. From twenty to fortyfive the average number of hookworms harbored by the men remains very constant and very high, while the average number of worms harbored by the women falls after the eighteenth or nineteenth year, when they usually marry, assume household duties, and thenceforward devote but little time to work in the fields (Fig. 53).

Hookworm Disease in Children. A special study was made of the severity of hookworm disease in children. No children under four were included in the studies and very few under six, because it is difficult to secure all the stools passed by very small children. The

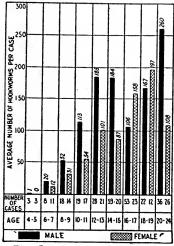


Fig. 54.—Severity of hookworm infection by sex and age groups. Based on worm counts among 393 cases under twenty-four years of age. Brazil

test included 246 infected males and 147 infected females ranging in age from four to twenty-four years, and representing all classes of society in Brazil. They were chiefly, however, the children of field laborers. the main they had never been to school, had never worn shoes. and had always lived within a radius of five miles of their homes. The results were subdivided by sex and tabulated according to two-year age groups (Fig. 54).

The number of worms harbored was shown to increase gradually and progressively as the person increased in age. Children between four and five had almost no hookworms; those from five to eight, very few. Children over eight who worked in the fields were heavily infected. Among males after the eighteenth to nineteenth year

the incidence continued to rise; among females, for the reason previously explained, there was a sudden drop in the incidence.

METHOD OF CONDUCTING WORM-COUNT STUDIES

In conducting worm-count experiments a large number of individuals are registered in the communities selected for study, and their hemoglobin indices are determined with the Dare apparatus. In each community a representative group is then chosen for treatment and further study. This group usually consists of twenty-eight or thirty persons, two thirds of whom are adults over fifteen years of age and one third children from eight to fifteen. Records for each individual give the name, age, sex, occupation, and hemoglobin index; whether or not the spleen is palpable; whether there has been previous malaria or previous anthelmintic treatment; and the results of the preliminary microscopic examination of the stools for hookworm ova.

The first treatment administered to a patient is termed the trial treatment. It varies according to the factors that are to be studied. Ten or fifteen days after the trial treatment, the test treatment is given to remove all of the hookworms that have remained after the trial treatment. An interval of this length should be allowed for the thorough excretion of the medicine administered in the trial treatment. The test treatment is always the same. It consists of a saline purge given at 8 p. m., followed the next morning by 3 mils of chenopodium administered in three equally divided doses, the first at 7, the second at 8, and the third at 9 o'clock. A final purge is given at 10:30 a. m. For children the dose of chenopodium is reduced to 1.5 mils in three equally divided portions.

To facilitate identification and to avoid confusion in handling the stools, each patient who has been treated is tagged on the wrist with a number and receives a chamber-pot which bears the same number. During the treatment careful entry is made of the hour of administration and the amount of the purge, the dosage of the anthelmintic, and the time of treatment. All symptoms, however trivial, are recorded. The entire stools are saved in the numbered chamber-pot for twenty-four hours after treatment, when the patient is given a second pot in which he saves his stools another twenty-four hours. The stools are carefully washed through No. 40 copper gauze on the day when they are received, and all the worms are picked out, counted, and classified.

III

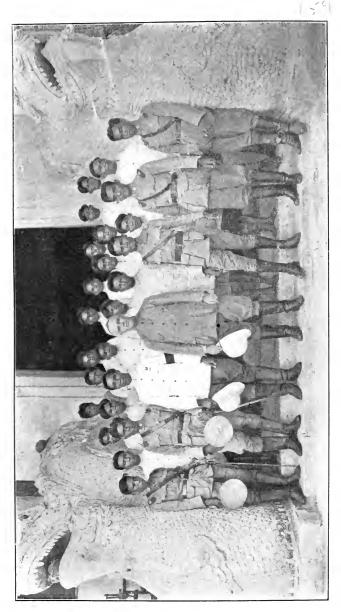
HOOKWORM CONTROL

There are at least two means by which treatment for hookworm disease may be made more readily available to the many million inhabitants of tropical and subtropical countries who are under the burden of a heavy hookworm infection: preliminary microscopic examination can be omitted in regions of heavy infection; and an efficient treatment can be administered as a routine, with the expectation that effective sanitation and post-campaign treatment will eliminate whatever light infection remains.

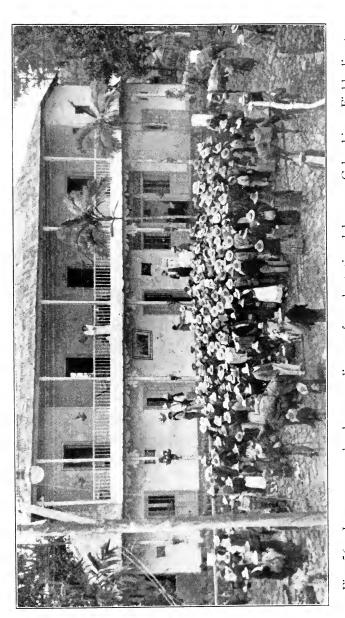
Impracticability of Insisting Upon Absolute Cure. Large numbers of worm-count studies conducted by Darling and Smillie have shown that two standard treatments (1.5 mils each) of oil of chenopodium remove an average of 95 per cent of the hookworms harbored, and that three treatments remove an average of 98 to 99 per cent of all worms. Further medication to remove the few worms that remain after two or three treatments is hardly worth the effort. Moreover, since it has been shown that diagnosis by microscopic examination fails in about 50 per cent of lightly infected cases, it is difficult to determine accurately whether any worms remain infected persons who have taken two or more treatments. In view of these facts, several countries have adopted modified working methods to accelerate the rate of treatment.

Experimental Plan of Control for Ceylon Estates. More than 99 per cent of the Tamil laboring population of Ceylon are infected with hookworms. Preliminary fecal examination is therefore omitted in the case of all except 10 or 20 per cent of the laborers on each estate. If the specimens obtained show over 80 per cent infection, the whole labor force, except persons less than a year old, those physically unfit for treatment, and pregnant women beyond the third month, are given one or two medium doses of chenopodium with an interval of one week between. All are examined clinically beforehand to be sure that they are fit to take treatment. Ten days after the first or second treatment, fecal specimens are obtained from all those who have been treated. Persons whom the microscope indicates to be positive after two treatments are given a third treatment.

Modified Control Program in Trinidad and Papua. In certain rural districts of Trinidad where the population is so widely scattered that an intensive campaign would of necessity make its way very slowly, a modified control program has been put into operation for the purpose of rapidly reducing mass infection. A treatment center is established in each district, a census is made of the entire population, and all persons are given one microscopic examination. Those



the temple of Sankampang. Director Barnes stands fourth and Major Luang Boriracksha, a prom-Fig. 55.—Staff for the relief and control of hookworm disease in Siam. Grouped at the entrance of inent figure in health work in Siam, fifth from the left of first row



Field director Fig. 56.—Lecture on hookworm disease for plantation laborers, Colombia. exhibiting chart on porch

found to harbor hookworms are urged to report for treatment at the community center. Four treatments are administered to each individual. No re-examinations are made, since previous experience in Trinidad has shown that four treatments (thymol is the drug com-

monly employed) cure 98 per cent of all patients treated.

In Papua, also, a special plan of work has been developed for extending control measures rapidly throughout the island. At the time of the initial survey of each estate an adequate number of sanitary latrines are installed and all laborers are given one treatment. The staff then moves on to the next estate, leaving a supply of anthelmintics in charge of a responsible person, who is commissioned to administer treatment systematically to all natives twice a year. It is believed that this plan will succeed in reducing mass infection, and that subsequently more intensive methods may be applied.

Modified Working Plan Tentatively Adopted for Brazil. In Brazil, too, where more than ten million people, scattered over a vast and sparsely settled area, are awaiting treatment, conservative modification has been made of the plan originally followed. This modified procedure involves a census of the community; one, and only one, microscopic examination of all persons;1 and two treatments of oil of chenopodium administered with an interval of ten days to each infected person. Individuals with hemoglobin below 60 are treated three times without additional microscopic examination, unless malaria is a controlling factor in the anemia. In addition, all persons suffering from any form of intestinal helminthiasis whatever are treated once, as well as all the members of any family which contains even one infected individual. It is believed that this plan will reach all infected persons and succeed in eliminating at least 95 per cent of the intestinal parasites they harbor. Systematic effort is made during the treatment campaign to secure the construction of latrines at all the homes and to bring the people to understand the importance of using them as a safeguard against re-infection.

Treatment Inadequate as Sole Means of Control. Experience in many parts of the world has demonstrated that hookworm disease cannot be effectively controlled by treatment alone; if the benefits are to be other than transitory, treatment must be preceded or accompanied by adequate precautions against re-infection. This fact has been forcefully demonstrated in Ceylon, Trinidad, St. Vincent, Nicaragua, and various other countries in which control measures have been carried out. Between the years 1904 and 1910 approximately 288,000 Porto Ricans were treated for hookworm disease by the Anemia Commission under Ashford, King, and Guiteras, and striking benefits were conferred over vast areas, but there is still a high incidence of infection in Porto Rico because much

¹ In some sections of Brazil, where, as in Ceylon, there is a uniformly high rate of infection, preliminary microscopic examination is dispensed with, and treatment is carried out on the assumption that all persons are infected.

had to be done in the way of preliminary education before sanitary measures could be introduced.¹

The history of hookworm work in the republic of Colombia illustrates anew the necessity of accompanying hookworm treatment with preventive measures. Since 1895, spasmodic efforts have been made to relieve the infection through treatment, but they have proved at best merely palliative because of failure to insure the use of latrines. The survey conducted during 1920 brought out the fact that among persons previously treated the infection rate was still 81.7 per cent,

90 81.2 80 PERCENTAGE OF INFECTION 70 60 50 40.6 40 30 20 10 WITHOUT WITH PRIVIES PRIVIES

Fig. 57.—Rôle of latrines in controlling hookworm disease. Comparative incidence (based on examination of 8,465 cases) of the disease among users and non-users of latrines. Colombia

as compared with the rate of 76.9 per cent for the general population irrespective of whether they had been previously treated. Treatment of the people is worth while as a means of reducing mass infection and as an educational feature that may be expected to lead to the provision and use of sanitary conveniences; it is inadequate, however, as the sole measure of control.

Spread of Disease Through Lack of Latrines. In Colombia. despite the fact that intermittent efforts to stamp out the disease had been going on for twenty-five years, more than 95 per cent of the rural homes were found, at the time of the 1920 survey, to be without latrine accommodation. Even in the larger towns-with the exception of Bogotá—there was no established system of night soil disposal: each householder was left to follow his own devices and many of them made not even the slightest pretense at sanitation. The feculent soil that results from such conditions forms, as one

would expect, a constant menace to the public health. Of a total of 8,465 persons examined during the progress of the survey, it was found that only 646, or 7.6 per cent, were in the habit of using latrines. Among these persons the rate of hookworm incidence was only 40.8 per cent, as compared with the rate of 81.2 per cent among persons who did not use latrines (Fig. 57). Similarly, the survey of

¹Through inadvertence, the Fifth Annual Report of the International Health Board, and lithographed report No. 7525 by Dr. John B. Grant, entitled *Hookworm Infection Survey and Malaria Survey of Porto Rico*, did not pay due tribute to the effective work of the early Porto Rico commission. Advantage is taken of this opportunity to correct the omission.



Fig. 58.—Sanitary latrines just completed under supervision of Jefferson county health department. Suburbs of Port Arthur, Texas (see Fig. 59)

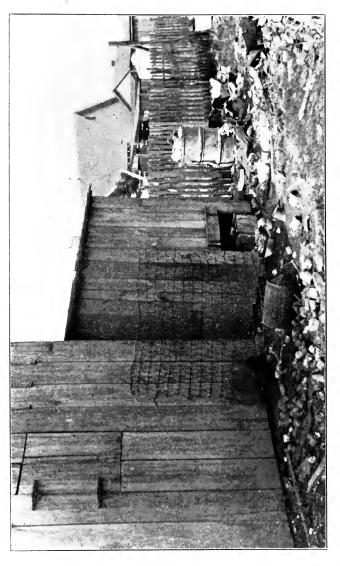


Fig. 59.—Insanitary condition of alleys and yards in suburbs of Port Arthur, Texas, before Jefferson county health department began work (see Fig. 58)

Santa Catharina showed that only 57 per cent of the persons who regularly used latrines were infected with hookworm disease, as compared with 87 per cent infection among the persons who did not use them.

None of the numerous tea estates visited in Madras presidency, India, were found to be provided with latrine accommodations for their laborers. Soil pollution was general on all of them and

accounted in large measure for the almost universal infection among the laborers. Similarly. in rural districts lying along the littoral of Brazil, where practically all of the people are infected, it is a rare thing for the homes to be provided with latrines. Of 2,875 rural homes inspected in the district of Jacarepagua, located only fifteen miles from the Federal capital, 78 per cent were found to be without latrines at the beginning of control work; and reports from São Paulo, Paraná, Santa Catharina, and other states show similar conditions. In the town of Guaratuba in the state of Paraná, with 600 inhabitants, there was only one latrine, of the pit type. Of 1,423 homes inspected in the municipality of Aguas Virtuosas in the state of Minas Geraes, 88.5 per cent had either no privies or privies inadequate for preventing pollution of the soil.

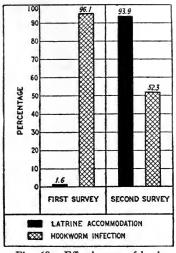


Fig. 60.—Effectiveness of latrines in preventing spread of hookworm infection, Central Mahé area, Seychelles Islands. Compare incidence of infection in first campaign, when there were few latrines, with that in second campaign, when latrine accommodation was almost adequate.

Recent Survey of Panama and Colón. The important rôle of sanitation in the control of hookworm infection was well brought out by work conducted during 1920 among school children in the cities of Panama and Colón. In type of soil, in elevation, and in climatic conditions these cities do not differ from the rural regions surrounding them, nor are the habits of their people essentially unlike those of their rural neighbors. From the standpoint of hookworm infection the fundamental difference lies in the fact that since the American occupation in 1904 the cities have had a modern system of sanitation.

¹The fact that latrines are erected does not guarantee that they will be regularly used. Non-use of latrines on the part of some of the population, or failure to erect the latrines soon enough after treatment in the first campaign, may account for the 52 per cent infection recorded in the second campaign.

Two thousand twenty-one (2,021) children were examined for hookworm disease in these cities. Of these, only 608, or 30.1 per cent, were found infected. This is in striking contrast to the rate of 99.2 per cent established during the past two years by the examination of 8,791 children in interior sections of the republic, where sanitation practically does not exist. When all children who had resided in or visited rural regions were excluded from the city statistics, there remained only 229, or 11.3 per cent of those examined, who had apparently acquired their infection within the city limits. This rate is 88.6 per cent lower than that which obtained among children in other sections of the republic.

Importance of Advance Sanitation. Nowhere has the effectiveness of adequate preliminary sanitation been better demonstrated than in the mines of Australia. Experience with hookworm disease in the mines of America and Europe had caused apprehension lest the deep and warm mines of southern Australia had similarly become infected. The Australian mines present conditions of soil, temperature, and humidity that are favorable for hookworm disease, and have derived at least a part of their labor force from regions of the earth where mine or surface infection is known to exist. Yet the examination during 1920 of over four thousand miners and mine employes in South Australia, Victoria, and New South Wales failed to reveal a single case of hookworm infection. The principal factor which has kept the mines of Australia free from hookworm is the precautions which the mine management and the miners themselves have taken to guard against soil pollution. A system of pail latrines, placed in use when the mines were first opened, has ever since been cleanly maintained and regularly used.

Government Interest in Advance Sanitation. In practically all countries where work is now under way it is not difficult to secure the installation of sufficient latrines, usually in advance of treatment. The next step—to secure and enforce a system of inspection to guarantee their continued use—is less easy. This remains after three years the outstanding problem of the work in Ceylon. The movement for advance sanitation that originated in that colony in 1917 is now making itself felt in Australia, the Seychelles, Papua, the West Indies, Central America, and Colombia. In British Guiana a budget of \$100,000 annually for a period of five years has been voted for sanitary improvement and a large part of this will be spent in sanitating areas in advance of hookworm treatment; in Trinidad, £50,000 of a new £1,000,000 bond issue has been allotted for sanitation; in Grenada satisfactory sanitary work is in progress; and in Jamaica and Porto Rico definite provision has been made for preliminary sanitation and for co-operation in control measures. In all countries the practical sanitary work demanded in the hookworm control demonstrations is resulting in the upbuilding of permanent sanitary agencies.



Fig. 61.—Excellent sanitary conditions have prevented hookworm disease from gaining a foothold in the mines of Australia. View of interior of change house, South Mine, Broken Hill, New South Wales

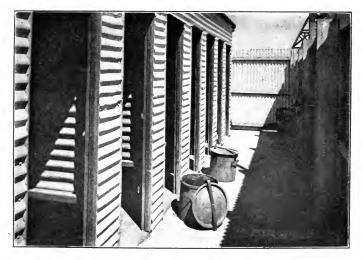


Fig. 62.—Surface latrine showing pails for use underground. Zinc Corporation Mine. Australia. Latrines are used by all employes, underground and surface

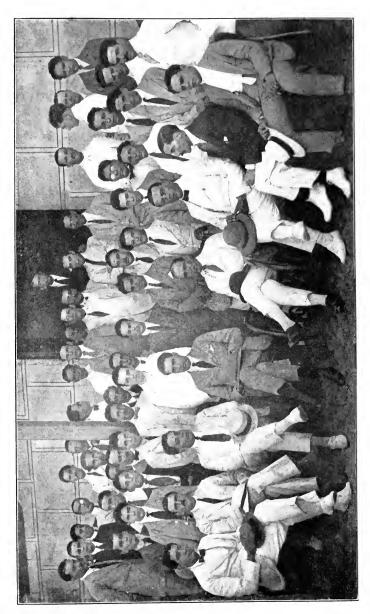


Fig. 63.—Department of Soil Sanitation, Republic of Colombia

Advance Sanitation in Colombia. Colombia is now making striking progress in securing the installation and use of latrines in advance of the carrying out of further hookworm examination and treatment. At the beginning of operations, June 14, 1920, only 3 per cent of the 51,911 homes inspected were provided with latrine accommodations of any description; on December 31, 1920, about 50 per cent of these homes were provided with satisfactory conveniences. The total latrines erected during the six-months period numbered 25,246. The plantations made an especially good showing in latrine

building, many of them attaining a record of 100 per cent. Staff members were not sent to examine and treat the people in any area until all necessary latrines had been built. So ready, however, were the people to comply with the sanitary regulations that it was impossible to provide dispensary units rapidly enough to keep pace with the program of sanitation.

Organization of Sanitary Department in Colombia. The sanitary work in Colombia is entrusted to a permanently organized Government department vested with police powers. This division was created by special decree on February 5, 1920. Its personnel, consisting in June of two field directors and eight sanitary inspectors, had by October 15 been enlarged to include seven field

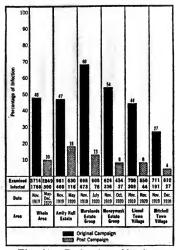


Fig. 64.—Reduction of hookworm infection on five estates of the Vere Area, Jamaica. Comparative incidence of infection in first and second campaigns

directors and sixty-five sanitary inspectors. These men were divided into seven squads to operate in seven provinces, a sanitary inspector being assigned to each municipio (or district) of the province. Government makes latrine construction obligatory upon all proprietors of habitable houses. Failure to construct a latrine within twenty days after notification is punishable by a fine of from twenty to forty pesos. All members of the division have power to impose fines and to make them effective.

Advance Sanitation in Central America. In Nicaragua, at the close of the third quarter of 1920, the work entered definitely on a new phase—that of carrying out curative measures in areas where there had been advance sanitation. In the early work in this country preventive measures were out of the question. In the entire

area where curative work was under way at the close of 1920, 75 per cent of the homes had been provided with a good type of latrine at least six months in advance of the opening of the work. The area wherein operations will be conducted during the first six months of 1921 has already accomplished 90 per cent of privy construction.

In Panama, too, there has been developed a new plan of work whereby the entire staff will be concentrated in one province and sanitary construction will precede treatment. In Salvador the staff has endeavored so far as possible to precede relief measures by sani-

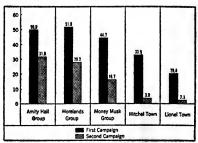


Fig. 65.—Reduction in severity of hookworm infection following control measures. Infected persons who required more than two treatments to cure, first campaign and second campaign compared. Five estates of Vere Area, Jamaica

tary campaigns especially related to the construction of latrines. While progress in the latter country during 1920 has been somewhat slow, it has nevertheless been distinctly more encouraging than in former years. It is unfortunately still necessary to begin curative measures when only three fifths of the homes in an area are provided with latrines, but the provision of even three fifths of the homes with sanitary conveniences is a step in the right direction and the proportion may be increased as time goes on.

Sanitary Progress in Brazil. Of the eighteen Brazilian areas in which co-operative control demonstrations were carried out in 1920, satisfactory sanitary progress is reported from only four: Jacarepagua in the Federal District, Guaratuba in the state of Paraná, and Itajahy and Florianopolis in the state of Santa Catharina. In the municipality of Jacarepagua all houses near small centers of population now have latrines. The only houses remaining unsupplied are scattered widely throughout the hills on the outskirts of the area. The intensive work in this district closed on June 30, but the sanitary work continues and a permanent force of sanitary inspectors will be maintained indefinitely. By the end of 1921 it is hoped that all permanent habitations in the district will be provided with latrines of one type or another. In the state of São Paulo Government has adopted a sanitary code and will inaugurate at once active efforts to enforce it. Past progress here has been due mainly to the effort of owners of coffee farms, who, oftentimes in advance of the treatment campaign, have made provision for installing latrines.

Reduction of Hookworm Infection. With a view to determining the degree of success achieved by measures for the control of

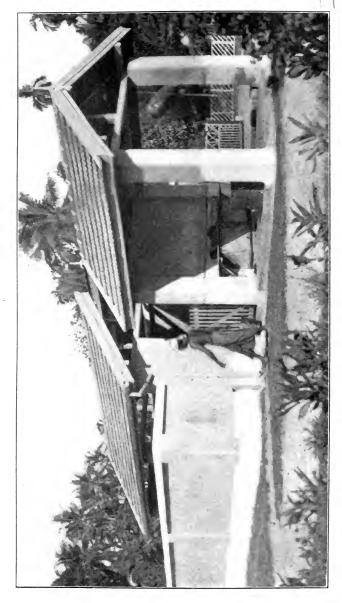


Fig. 66 — Durable and efficient type of public latrine. Bucket system with concrete superstructure. Heneratgoda, Ceylon. (Note cooly scavenger at work)

Fig. 67.—Well built pail latrine and incinerator. Ceylon

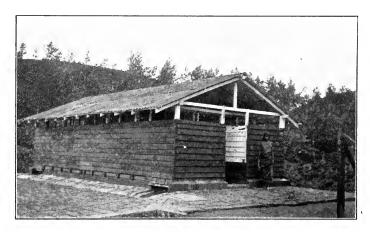


Fig. 68.—Excellent type of pit latrines for estates. Kept lighted at night. Ceylon

hookworm disease, re-surveys have been made from time to time of areas in which operations had been conducted in earlier years. The re-surveys conducted during 1920 in Jamaica and in the county of Escasú, Costa Rica, showed that control operations had effected substantial reductions in the incidence of the disease. On the Vere Estates in Jamaica, at the time of the original campaign in November, 1919, the rate of infection was 48 per cent; at the time of the re-survey

in 1920 it was only 10 per cent (Fig. 64, page 169). The infection rate in the county of Escasú was 59 per cent in 1917; in 1920 re-examination of ninety-three persons whose treatment had been completed three years earlier showed an infection rate of 32 per cent—a reduction of 27 per cent.

Twelve representative counties of four southern states were also re-surveyed in 1920. The statistics indicate that the average infection rate of 59.7 per cent which prevailed at the time of the initial survey in 1911 had been reduced to 21.7 per cent at the time of the re-survey in 1920—a reduction of 38.0 per cent (Fig. 25, page 113).

Persons found on a second survey to be re-infected with hookworms harbor a much smaller number of worms than they harbored at the time of their first treatment. Of 286 re-infected persons treated during the second campaign on the Vere Estates in Jamaica, 78 per

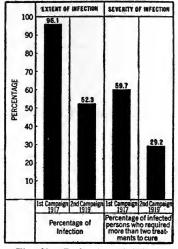


Fig. 69.—Reduction of infection in Seychelles Islands. Incidence of infection in first and second campaigns compared. The lightness of the infection in the second campaign will be seen by comparing the two bars to the right, which indicate the percentage of infected persons who required more than two treatments

cent were freed of worms by two treatments, and in not a single instance were more than four treatments necessary (Fig. 65). In the first campaign in this area, on the other hand, the treatment of only 58 per cent of the patients was completed by two treatments, and in some cases it had been necessary to give as many as ten treatments. In the Seychelles Islands, again, 70.8 per cent of the total number of persons freed of worms in a re-campaign were relieved of their infection by two treatments, as compared with only 40.3 per cent in the first campaign one and one-half years earlier (Fig. 69).

¹All of these re-survey figures are based on search with the microscope for eggs in the feces.

DIAGNOSIS AND TREATMENT OF HOOKWORM DISEASE

Hookworm infection may be diagnosed by administering a vermifuge and searching the stools for hookworms, or by omitting the vermifuge and microscopically examining specimens of feces for ova. It has been customary in field work to rely almost wholly upon variations of the latter method. There are culture methods by which the presence of the infection may be demonstrated, but these are hardly practicable for field use.

DIAGNOSIS BY MICROSCOPIC EXAMINATION

In areas where less than 85 per cent of the people are infected, it is desirable, before administering treatment, to determine whether the infection is present by microscopically examining the feces. Several means of making the examination have been developed, of which the simplest is the plain smear method. This consists of mixing on a two-by-three-inch slide a small portion of fecal matter with a few drops of water, and examining by low power magnification three films made from the mixture.

A more accurate diagnosis can be made with the aid of the centrifuge. When this method is used, a portion of the fecal specimen is thoroughly stirred in a metal cone with five times its volume of water and allowed to settle for a few minutes. Then the supernatant fluid, with ten times its volume of water, is poured into a centrifuge tube and centrifuged rapidly for five minutes. At the end of this time slides for examination with the microscope are prepared from the deposit on the cork of the tube.

Methods of Detecting Ova in Lightly Infected Specimens. Both the plain smear and the centrifuge method, though reasonably dependable when large or moderate numbers of hookworms are harbored, fail to diagnose accurately a considerable proportion of light infections. The need for a microscopic technique which would succeed where these fail has led to the development of a number of methods which secure the concentration of a large number of ova on a slide.

a. Lane levitation method. Clayton Lane recommends a technique which he designates as the levitation method. In this procedure the concentrated sediment of a centrifuged specimen is transferred to a

glass slide, where it is mixed with one mil of water. The slide is allowed to stand for five minutes and is then immersed in water and manipulated until all coarse matter has floated free. The hookworm ova stick firmly to the slide and are not washed away. Lane reports that on an average this method results in a ten-fold concentration of ova.

b. Glycerine-salt method. Barber in the course of his work in the Federated Malay States developed what is known as the glycerine-salt method of examination. In this the fecal specimen is diluted with a fluid composed of equal parts of glycerine and a saturated solution of magnesium sulphate. The mixture is thoroughly stirred and broken up with a toothpick, a process which releases the hookworm ova and causes them to rise to the surface. When the upper part of the fluid in each container is placed on a slide, a large num-

ber of ova are brought under the lens of the microscope.

c. Brine flotation-loop method. Kofoid and Barber during their work with the United States Army achieved good results with the brine flotation-loop method of examination. This process demands that a large fecal sample be thoroughly mixed with concentrated brine in a paraffin paper container of from fifty to seventy-five the surface by means of a disk of steel wool, and the container is allowed to stand one hour. The upper film is then lifted off with a wire loop one-half inch in diameter and transferred to a slide for examination. The great advantage of this method is believed to lie in its easy utilization of large samples. It eliminates to a large extent the element of random sampling and insures a sufficient number of ova on the slide to make detection possible even when the infection is so light that the ova would be overlooked by other methods using smaller samples.

d. Willis levitation technique. Willis has developed a simplified levitation method which requires no apparatus other than the microscope. This procedure calls for the removal, from the tin in which the fecal specimen has been collected, of enough of the specimen to leave the container not more than one-sixth full. A saturated solution of coarse table salt is then added drop by drop to the specimen until the container has been filled to the brim. The mixture is thoroughly stirred and allowed to stand for a few minutes to permit the ova to rise. A clean polished slide is then placed on the container in contact with the surface of the fluid. In a short time the ova adhere to the slide, which is then removed and placed under the microscope for examination. The advantage of this method lies in its rapidity and in the fact that it secures a good concentration of ova with the use of a small specimen—a factor which makes it suitable for use in field work, especially in remote districts where specimens have to be carried on horseback for many miles.

DIAGNOSIS BY ADMINISTRATION OF VERMIFUGE

The most accurate method of diagnosing hookworm infection is by administering vermicidal treatment and examining the stools for worms. This method is of especial value for determining both the type and the number of hookworms harbored. It is not, however, practicable as a routine field measure. To diagnose infection by this method, it is customary to administer treatment according to the routine method and to save all stools passed by the patient for the succeeding seventy-two hours. The patient should be restrained from eating vegetables with coarse fibres during this period, as these, when passed with the stools, may interfere with the search for worms.

Method of Washing Stools. A regular routine is followed in washing the stools. Those that are soft or fluid are washed at once; the more compact stools are mixed with water and stirred until soft. The washing is done by means of a jet of water played with moderate force into a large brass wire sieve (mesh fifty to an inch) into which the feces have been poured. The washed stool is distributed into photographic developing trays, a small portion into each tray. A dark brown tray furnishes the best background for the worms. The worms are then picked out with needles or with forceps and placed in properly numbered Petri dishes containing normal salt solution. Later the excess salt solution is drained off, and the worms are killed by flooding the dishes with boiling alcohol (70 per cent). After the worms are scalded, they become rigid and assume shapes that are characteristic of their species. This renders differentiation comparatively easy and permits rapid counting of the worms.

TREATMENT OF HOOKWORM DISEASE.

Chenopodium is now the definitely preferred anthelmintic for treating hookworm disease. However, it sometimes has an injurious effect upon persons to whom it is administered. Alarming symptoms, and on rare occasions deaths, have been reported from various areas following the administration of the drug in accordance with accepted methods of treatment. Children are especially susceptible to its toxic qualities. Of ten fatalities from chenopodium reported in Brazil during the Board's four years of work in that country, all but one occurred among children ten years of age or less. In Colombia during 1920 seven deaths, all of which were among children, occurred after treatment with chenopodium. It is essential, therefore, that medical officers exercise careful supervision over the use of the drug in the field and that they prescribe for children a dosage smaller than is indicated by Young's rule.

Standard Method of Administering Chenopodium. The standard method of administering chenopodium in field work is that



Fig. 70.- Demonstrating the actuality of hookworms to native peoples. Group awaiting turn to \supset view the worms with the microscopes. Sankampang, Siam

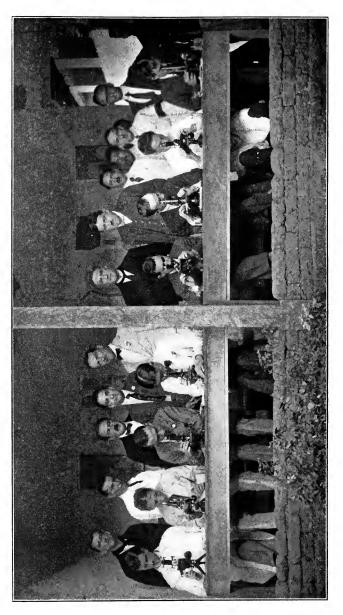


Fig. 71.—Training microscopists for field work. La Mesa, Colombia. Hookworm control operations were inaugurated in this country during the year

recommended by Darling and Smillie as a result of investigations in the Federated Malay States and in Brazil. It consists of an adult dose of 1.5 mils administered in freshly filled hard gelatine capsules. The drug is given in two equal portions, one at 6 a.m. and one at 8 a.m. The last capsule is followed in two hours by a saline purge. No preliminary purge is given. The patient is allowed no food from 8 p.m. of the day preceding treatment until after the prescribed medication has been administered and the purge has acted well. At 7 a.m., however, a small cup of black coffee may be permitted. For children the dosage of chenopodium is graded according to age: those between five and eight years receive one drop of the vermifuge for each year of age; those over eight years are given two drops for each year. The dropper employed is so graded that thirty drops equal one mil.

In the Brazilian experiments one treatment according to this method was found to remove 83 per cent of all hookworms present, and two treatments approximately 95 per cent. The treatment is easily and cheaply administered and produces very little discomfort.

Efficiency of Chenopodium in Undivided Doses. Darling and Smillie found that in so far as single treatments were concerned, the best results were obtained when chenopodium was administered in an undivided two-mil dose, preceded by a saline purge on the evening before treatment and followed two hours after treatment by a similar purge. With this technique 93.8 per cent of the worms harbored were removed by one treatment. Under hospital or dispensary conditions this technique may be employed as easily and as cheaply as the standard method recommended for field use. It causes less discomfort to the patients than other methods, and by its provision for the rapid elimination of the drug it entails less danger of toxic symptoms. It is not, however, adapted to field conditions, especially in sparsely settled rural communities where the administration of a preliminary purge is a difficult and expensive procedure.

Omission of Preliminary Purge with Oil of Chenopodium. Many authorities hold that better results are obtained from chenopodium if a pre-treatment purgative is given. The field experiments of Darling and Smillie, however, have indicated that a preliminary purge, instead of adding to the efficiency of a divided 1.5-mil dose of chenopodium, slightly diminishes it in the case of adults. This dosage preceded by a purge was found to remove 90.7 per cent of the worms present, whereas without the preliminary purge it removed 91.0 per cent of all worms. There was relative failure of treatment in 35 per cent of the cases receiving a preliminary purge and in 21 per cent of the cases not receiving one. When smaller doses of chenopodium were given, as in the treatment of children, preliminary purgation greatly lowered the efficiency of the drug. A dose of .6 mil preceded by a purge removed only 70.6 per cent of the worms har-

¹ In these experiments a treatment was considered to have failed if it left the patient with ten or more worms.

bored; with preliminary purgation omitted it removed 85.6 per cent. Treatment failed in 100 per cent of the cases receiving a preliminary purge and in only 33 per cent of those not receiving the purge.

When a preliminary purge is administered under field conditions, it frequently so weakens the patient as to unfit him for work the next day, thereby greatly prejudicing him against treatment. Often it causes extreme prostration. In sparsely settled areas its administration is difficult and almost doubles the cost of treatment. It seems advisable therefore to omit preliminary purgation in field work. This was done during 1920 in Brazil, Ceylon, Australia, Salvador, and Guatemala. In none of these areas were there any ill effects or any decrease in the percentage of cures.

Effect of Preliminary Abstinence from Food. Authorities as a rule advise a very light diet during the twenty-four hours preceding treatment. Theoretically, abstinence from food for from fifteen to twenty hours before chenopodium administration should, by leaving the intestinal tract empty, greatly enhance the efficiency of the vermifuge. Field experiments conducted by Darling and Smillie, however, have shown that by far the best results from the chenopodium are obtained when patients are allowed their usual diet on the day before treatment but no food on the morning of treatment. When this procedure was followed and the preliminary purge omitted, 91.0 per cent of the worms harbored were expelled by one treatment (1.5 mils). When patients were allowed no solid food after 11 a.m. of the day before treatment and no nourishment of any kind after 5 p.m., and when the preliminary purge was omitted, one treatment removed 90.1 per cent of all worms. Among persons from whom food was withheld, treatment failed in 60 per cent of all cases, while among those who received an ordinary diet on the day before treatment, there were only 21 per cent of failures. Moreover, prostration and severe toxic symptoms were universal among persons who did not receive food.

In the case of children, who received small doses of the drug, only 35.6 per cent of all worms were removed when food was withheld, and there were 100 per cent of treatment failures; among children who were allowed an ordinary diet, 85.6 per cent of all worms were expelled and there were only 33 per cent of treatment failures.

In field work conducted in Ceylon and the Seychelles Islands, also, it was found that patients who ate an ordinary meal on the afternoon before treatment were much less apt to suffer collapse after the administration of chenopodium than those who were limited to a light repast. Furthermore, there was no diminution in the percentage of cures when a regular diet was permitted.

Simultaneous Administration of Food and Chenopodium. A series of experiments were made by Darling and Smillie during 1920 to determine the effect of administering food coincidently with chenopodium. Patients undergoing this test were subjected to no

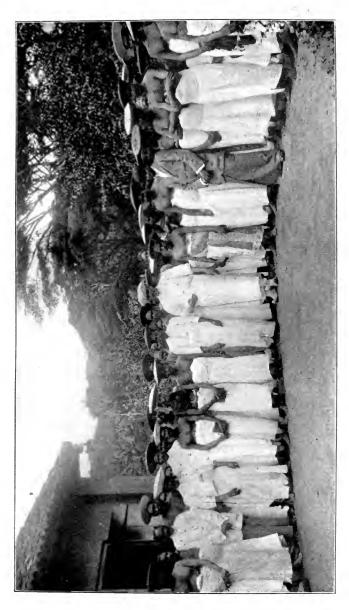


Fig. 72.—Group of village headmen assembled to hear a lecture on hookworm disease. Ceylon

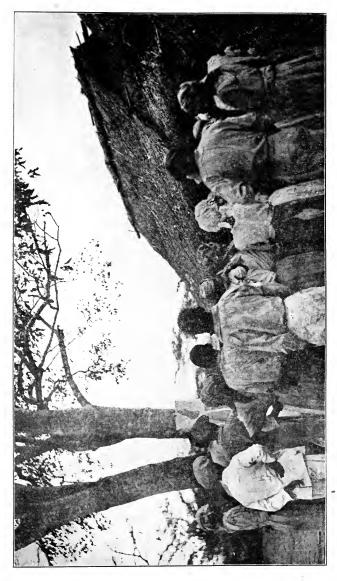


Fig. 73.—Eager listeners to chart lecture at Parnassus Creole Barracks. Jamaica

diet restrictions on the day before treatment and received no preliminary purge. On the morning of treatment they received .75 mils of chenopodium at 6 a.m. Between 6:30 and 7 a.m. they were allowed 250 mils of milk, 100 mils of coffee, and 200 grams of bread. At 8 a.m. they received a second .75-mil dose of chenopodium and at 10 a.m. a saline purge. This procedure caused no toxic symptoms nor even the mild discomforts which usually attend treatment with chenopodium, but it greatly lowered the efficiency of the drug. It removed only 56.2 per cent of all worms harbored and failed in 58 per cent of the cases treated.

Magnesium Sulphate Most Commonly Used Purgative. The question as to the best purge for use in connection with hookworm treatment has not been definitely settled. The one most extensively used is magnesium sulphate. The rapidity of action of this purgative has been found to vary in inverse proportion to its concentration. Experience in Ceylon has shown that when a strong solution is administered, catharsis is often delayed until evening of the day of treatment, or even until the next morning. A weaker solution (two pounds of salt to a gallon of water, or about one and one-half drams to the ounce) gives much prompter action and is less apt to cause griping or collapse. The most satisfactory dosage of this weaker solution of magnesium sulphate appears to be two and one half ounces for adult males and two ounces for adult females.

Compound Jalap Powder an Efficient Purge. Washburn reports that in his recent work in Jamaica he used compound jalap powder with much success as a substitute for magnesium sulphate. The drug was given in capsule form, both as a preliminary purge and coincidently with the vermifuge. For the preliminary purge it was mixed with a small amount of powdered charcoal and administered to adults in doses of thirty to forty grains.1 In the treatment capsule it was compounded with thymol in the same manner and same amounts as milk sugar or bicarbonate of soda. When chenopodium was used, the jalap was placed in the capsule and the oil was dropped upon it. As a preliminary purge, compound jalap powder does not act so rapidly as magnesium sulphate; it can therefore be given on the afternoon instead of the evening preceding treatment, and the nurse is saved the necessity of visiting his patients at night. A final purge is not required when jalap is added to the treatment capsule, and an extra dose of purgative is not found necessary in so many instances as when a single dose of magnesium sulphate is given after vermifuge treatment. The powder is cheaper than magnesium sulphate, easier to administer, and not disagreeable to take.

Castor Oil Used Successfully with Chenopodium. Many authorities have found castor oil a satisfactory purge for use with

¹ The powdered charcoal was mixed with the jalap used in the capsule given for the preliminary purge in order to darken the capsule and thus render it easily distinguishable from the treatment capsule of thymol and jalap.

chenopodium. Salant's experiments showed that the resistance of animals to the toxic effect of chenopodium was much greater when the drug was preceded by a dose of castor oil. Quantities of chenopodium which invariably caused the death of animals when administered without castor oil, were received without symptoms of poisoning when the oil was given shortly before or after the vermifuge. Hall and Wigdor in their experimental treatment of 220 dogs found that when castor oil and chenopodium were administered simultaneously, good purgation was obtained and a high degree of protection was secured against gastro-intestinal irritation and the toxic effects of the vermifuge.

In Nicaragua during 1920 Molloy compared the cases receiving magnesium sulphate after chenopodium with those receiving castor oil. The latter group experienced practically no serious after-effects; in the former, severe symptoms were common. Persons suffering from inanition frequently experienced extreme prostration after taking magnesium sulphate. Following these observations Molloy administered, to all hookworm patients who showed evidence of severe debility, castor oil before, with, and after chenopodium. In less extreme cases of debility he administered chenopodium in half an ounce of castor oil, and gave a small dose of magnesium sulphate two hours after the last dose of vermifuge. Furthermore, he gave a dose of castor oil immediately to all persons who presented symptoms of poisoning following treatment with chenopodium.¹ No serious cases of poisoning occurred after the institution of these measures.

Standard Technique of Thymol Administration. countries where thymol is used, the dosage most commonly employed is that recommended by Stiles, Dock, Howard, Bass, and others of wide experience in the treatment of hookworm disease. It is based upon sixty grains as the maximum for an adult, preceded and followed by an active saline purgative. Children from one to five years of age receive from three to five grains of the thymol; those from six to ten, from ten to fifteen grains; and those from eleven to fifteen, from fifteen to thirty grains. Persons between sixteen and twenty years of age receive from thirty to forty grains; those between twentyone and fifty years, from forty-five to sixty grains; and those more than fifty years, from thirty to forty-five grains. The drug is usually administered in finely powdered form, mixed with equal parts of milk sugar or sodium bicarbonate. It is given in two equal portions, and apparent—not actual—age determines the dosage. Competent physicians examine all patients who are to take the drug, prescribe

¹ It is worth noting, however, that Darling, Barber, and Hacker have reported an experience directly the opposite of that indicated by Salant's, Hall and Wigdor's, and Molloy's results. In their investigations in the Orient they found that when castor oil was used with chenopodium, there was a noticeable increase in dizziness, deafness, and other toxic symptoms, as compared with the symptoms that resulted when magnesium sulphate was used.

the proper dosage for each, and supervise the important phases of treatment.

Conditions Governing Administration of Thymol. Food is not allowed from the time of the first purgative until after the final dose of salts has acted. Inasmuch as alcohol and oils, and gravy. butter, milk, and other fatty foods, are especially dangerous, the patient is cautioned against taking them at any time during the period of treatment. Under field conditions it is generally held that thymol should not be administered to persons suffering from acute diseases, such as malaria in the febrile stage or fevers of any other type; to those having chronic dysentery or diarrhea, organic cardiac or renal disease, pulmonary tuberculosis beyond the incipient stage, or general anasarca; to those who are extremely weak or feeble from old age or from other cause; or to pregnant women or women with serious hemorrhagic diseases of the uterus. Thymol may be administered to persons suffering from any of these diseases only when the circumstances will permit rigid control of all features connected with the treatment.

OPERATIONS AGAINST YELLOW FEVER

During 1920 co-operative work against yellow fever was undertaken in Mexico; aid was given in the suppression of epidemics in Central America, in Brazil, and in Peru; sanitary surveillance was maintained to guard against a recurrence of the infection in Guayaquil, Ecuador; and the presence of the disease in West Africa was investigated. Work against yellow fever was therefore under way in every region in which it is known to exist, and steady headway is being made toward its control.

Mexico Undertakes Co-operative Anti-Stegomyia Campaign. Upon invitation of Government a co-operative program for the control of yellow fever in Mexico was adopted toward the close of 1920. A decree issued by the President shortly after the arrival in Mexico City of Colonel T. C. Lyster, director of yellow fever work in Mexico and Central America, authorized the inauguration of control measures throughout the infected districts, provided for the creation of a special yellow fever commission, and set aside 50,000 pesos for carrying out the work. All control operations under the new plan are to center in the Mexican Department of Health. The American personnel will regard themselves as representatives of this department.

During the last six months of 1920 yellow fever existed in Mexico from Tampico to Progreso in the east, and from Hermacilla to Tapachula in the west. This epidemic was checked under the able direction of the national Board of Health. The first efforts under the new co-operative program will be directed toward the points of greatest importance. Late reports indicate that in the first area inspected, a zone 150 kilometers in diameter with Vera Cruz as its center, the incidence of the disease is low.

Yellow Fever Eradicated from Guayaquil. One of the outstanding features of the yellow fever situation in 1920 was the official announcement made in July by the Director of Health of Ecuador that the disease had been entirely eradicated from that country. The infection, which had been present in Guayaquil since 1842, was brought under complete control in that city in June, 1919. Since then no vestige of it has reappeared, and there is every reason for believing that it has been permanently suppressed (Fig. 74). With the disappearance of yellow fever from Guayaquil it is believed that the last endemic focus of the disease in Ecuador has been eliminated. A modern water-supply system is being installed in Guayaquil. Until such time as it is in operation, Government inspectors will guard against a recurrence of Stegomyia breeding by maintaining strict supervision of all water containers. On November 29, 1920, Govern-

ment assumed full responsibility for the continued maintenance of the work, and the Board's representative withdrew from the country.

Reappearance of Yellow Fever in Central America. In Central America outbreaks of yellow fever occurred during 1920 in Salvador and Guatemala. A few sporadic cases were reported in Nicaragua. In Salvador the disease was first detected in the coastal plain city of Sonsonate, where a large military detachment recruited from all parts of the Republic had been gathered to suppress a threatened revolution. Many of the recruits had come from high altitudes and were therefore non-immunes. Between May 22 and August 21 there were

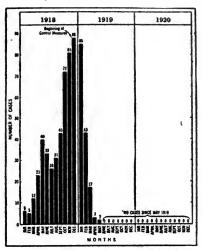


Fig. 74.—Incidence of yellow fever in Guayaquil, Ecuador, 1918–1920. The disease has been completely eradicated from that city as the result of antimosquito measures instituted there in November, 1918. Since May, 1919, there has not been a single case

fifty-six known cases of yellow fever in Sonsonate. The city was placed under strict quarantine, but despite this precaution the disease spread to seven other towns in the department of Sonsonate, to the neighboring departments of Santa Ana and La Libertad, and to Usulután. Meanwhile, smoldering foci of infection which had existed in the city of San Salvador as an aftermath of the epidemic of 1919 flared forth, and the disease spread rapidly to many sections of the city. In the course of the year twenty-five localities of the country were visited by yellow fever, and 181 cases in all were reported (Fig. 75, page 188).

In Guatemala the disease appeared in early June at Los Amates, whither it had probably been carried by an itinerant peddler from Sonsonate. Between June 5 and September 11 fifteen cases were reported. Later nine cases appeared in La Democracia, five in Zacapa, and one in Virginia.

Control Measures in Central America. The health authorities of Salvador and Guatemala at once put forth every effort to suppress these outbreaks, so that by the end of the year yellow fever had almost entirely disappeared from both countries. To insure protection against its recrudescence, anti-mosquito measures will be continued in every area of infection for at least a year after the ap-

pearance of the last case of the disease. Fish control will play a prominent part in these operations.

In Nicaragua and Honduras protective anti-mosquito work was carried on throughout 1920 to guard against outbreaks of yellow fever. During the coming year these precautionary measures will be continued. The Central American countries have taken a determined stand against yellow fever. It seems that their earnest efforts to control the infection must in the end win out.

Suppression of Epidemic in Peru. The elimination of yellow fever from Ecuador left only one center of infection on the Pacific coast of South America—the province of Piura in northern Peru.

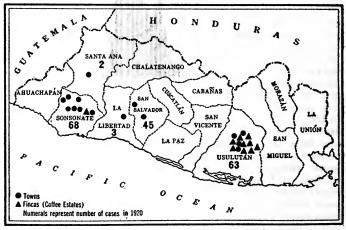


Fig. 75.—Map of Salvador showing location of yellow fever cases in 1920 epidemic

An epidemic of the disease had broken out in that region early in 1919 and had spread to at least ten towns by 1920. The incidence of the infection and the death rate were high. Under the direction of Dr. Henry R. Carter, the Government health service organized energetic measures for the control of Stegomyia breeding throughout the area, and at length succeeded in reducing the Stegomyia index below the danger point. As a result yellow fever had disappeared from the province by the end of October, 1920.

Controlling the Infection in Brazil. While measures were under way for eradicating yellow fever from the west coast of South

In February, 1921, yellow fever reappeared in Peru at a point south of the region previously infected. The disease crossed the desert from Piura and broke forth in several of the rather densely populated coastal towns of the department of Lambayeque. The Board is co-operating with Government in control measures which are being conducted under the direction of Dr. Henry Hanson.

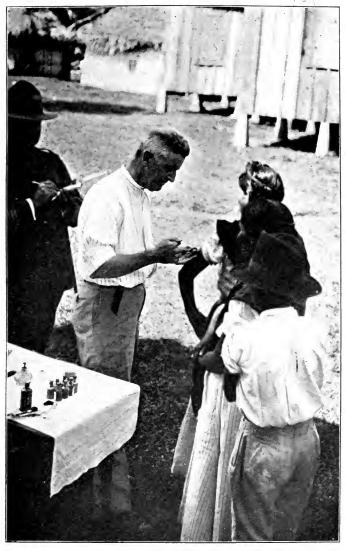


Fig. 76.—Colonel T. C. Lyster, of the Board's yellow fever staff, administering Noguchi yellow fever vaccine. Los Amates, Guatemala



Fig. 77.—Receptacles such as these were a favored breeding place of yellow fever mosquitoes at beginning of control effort in Guayaquil, Ecuador. Fish effectively prevented breeding in practically all these and other miscellaneous water containers

America, the public health service of Brazil was engaged in fighting the infection in the sections of that country where it still persisted. Early in 1919 epidemics of the infection had broken out in six of the northern states of the country. Government organized a central yellow fever commission for combating these outbreaks, and each state where the disease existed appointed a body with similar functions. The various measures which these organizations pursued for reducing the Stegomyia index throughout the infected regions resulted by the end of 1920 in yellow fever in epidemic form being entirely suppressed, and in endemic form being confined to the narrow strip of coastal area between Bahia and Pernambuco. Outbreaks of the disease which occurred in the states of Pernambuco and Sergipe during 1920 were soon controlled, and during the last four months of the year no verified cases were reported from any part of the Republic.

Pursuit of Yellow Fever in Africa. During 1920 a commission visited the west coast of Africa to investigate the nature of a disease which has prevailed in that region for some time and has frequently been reported as yellow fever. The commission, composed of R. E. Noble, M. D., Assistant Surgeon General of the United States Army; Juan Guiteras, M. D., Director of Public Health of Cuba; Adrian Stokes, M. D., Assistant to the Professor of Pathology, Trinity College, Dublin; A. E. Horn, M. D., of the West African Medical Service; and W. F. Tytler, M. D., of the staff of the Medical Research Council in Great Britain, arrived in Lagos, Nigeria, July 17. Here it established headquarters and opened a laboratory. From this point the members carried their investigations into Nigeria, Dahomey, the Gold Coast, Senegal, and Matadi in the Belgian Congo.

Further Study Required to Determine Presence of Infection. A study of such vital statistics and records of epidemics as were available in these localities indicated that yellow fever, or an infection closely allied to it, had existed endemically and epidemically for many years. For the period from May, 1915, to May, 1920, a total of eighty-six cases of yellow fever were reported in the British West African colonies alone. There were also records of epidemics in Dahomey at various times during the period from 1905 to 1917. In the Belgian Congo an outbreak was reported in 1917.

The commission remained in the West Coast area for a period of only fifteen weeks. During the brief time at its disposal it saw no authentic cases of yellow fever, nor was it able to observe any cases of a disease known locally as "shaura," which is reported to exist among the natives and to produce in its acute stages symptoms suggestive of yellow fever. To establish definitely whether this disease is or is not yellow fever, and whether, if it is not, yellow fever is present at all, will require a longer period of time and better facilities for investigation than the commission had at its disposal. Indeed, the task of tracking down yellow fever in this area is likely to prove

a most arduous one and to require prolonged local residence. It will involve following clues to the disease into native villages far from the coast and covering tremendous distances in sections where horse-back, hammock, and walking are the only means of travel. The tendency of the natives to hide all cases of disease from the authorities will also complicate the problem. The commission has recommended that another body of investigators be sent to undertake this difficult study and to suggest definite measures for the suppression of the disease if it is found to exist.

Use of Vaccine and Serum in Yellow Fever Control. Leptospira icteroides was first isolated by Noguchi in 1918 from cases of yellow fever in Guayaquil. Later (1919) the organism was obtained from yellow fever cases in Merida, Yucatan, and again (1920) in northern Peru by Noguchi and Kligler. Gastiaburu transmitted yellow fever to animals in Piura in 1919. Perez-Grovas, working in Vera Cruz, Mexico, during the summer of 1920, reproduced yellow fever in guinea pigs and obtained a culture. Le Blanc, of the Rockefeller Institute staff, also obtained a strain of the organism from a case of yellow fever in Vera Cruz (1921). The strains obtained by Perez-Grovas and Le Blanc have been found to be identical with the Leptospira icteroides isolated earlier.

The killed cultures of Leptospira icteroides were first used for protective inoculation against yellow fever in Guayaquil in 1918, where 427 vaccinations were carried out. The results were so encouraging (the morbidity rate among vaccinated and unvaccinated during the same period being 11 and 110 per thousand, respectively) that a vaccine several hundred times as strong has been made in large quantities and employed in Mexico by Drs. Vasconcelos and Casasus of the Consejo Superior de Salubridad; by Drs. Lyster, Bailey, and Vaughn in Central America; and by Drs. Lynn and Guadarrama in Tuxpan, Mexico. The total number of non-immune persons reported vaccinated is about 8,000. The development of protection. as in the case of other vaccines of this sort (anti-typhoid, for example), requires about ten days for completion, persons exposed to yellow fever just before vaccination or immediately afterwards not being protected by vaccination. Excluding such instances, however, there has been no case of vellow fever among the 8.000 persons vaccinated in the various localities, while among unvaccinated persons during the same period and in the same areas there have been about 700 cases of the disease.

The vaccine, by providing immunity, furnishes a rapid method for reducing the number of non-immune persons in areas where yellow fever is epidemic. By the application of sanitary measures to eliminate the mosquito carrier and of vaccination in the meantime to cut off from the infected mosquitoes the supply of non-immune material, a threatening epidemic of yellow fever in Guatemala and Salvador in 1920 is reported to have been checked within one month from the appearance of the first cases; that is, before a second set of cases had

developed. The value of vaccination as an emergency measure does not, however, minimize the importance of the anti-mosquito operations, the elimination of both factors—the non-immune human being and the infected mosquito—being useful in the control of yellow fever.

A therapeutic serum is also available for the treatment of yellow fever. It has already been employed in 152 cases by Drs. Lyster, Vaughn, and Bailey in Central America; by Drs. Vasconcelos and Casasus, Lynn, and Guadarrama in Mexico; and by Dr. Hernandez of the Junta de la Sanidad de Yucatan. Persons treated before the third day of illness have almost invariably recovered, the exceptions being those cases in which the quantity of serum used was too small to have any effect. After the fourth day of illness the injuries to organs are so great as to be irreparable in severe cases of yellow fever. By the use of the serum the usual mortality in yellow fever, 50 to 60 per cent, has been reduced to 9 per cent.

VI

COUNTY HEALTH WORK

In the Southern States demonstration campaigns in the control of hookworm disease have greatly stimulated the development of full-time county health organizations. These agencies seek to do for the rural people what the modern, well-equipped municipal health department does for the population of the larger towns and cities. The importance of this work will be appreciated when it is remembered that 54 per cent of the total population of the United States is rural,

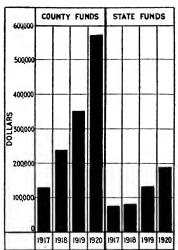


Fig. 78.—Increase in appropriations for county health work. Southern States, 1917-1920

and that in twenty-five of the states the rural population comprises more than three fifths of the total.

Ninety-seven counties in twelve southern states had, at the close of 1920, full-time health departments. Interest in public health matters has been stimulated, the people are voting taxes as never before for health purposes, and a sanitary sense is beginning to manifest itself. The marked increase in state and county appropriations is exhibited in Fig. 78.

In one of the states county health work has been in progress for more than three years. At the close of 1920 work of this kind was being conducted in twenty-four of its counties having a combined rural population which represented 33 per cent of the state's rural population. A

summary of the results accomplished in these twenty-four counties shows 28,345 persons examined and 5,469 treated for hookworm disease; 96,739 vaccinated against typhoid fever and 36,810 against smallpox; 13,670 cases of infectious diseases quarantined; 77,573 school children and 5,780 adults examined for physical defects; and 2,354 public health meetings held, at which the total attendance was 253,488. In addition, 23,547 privies at rural homes were either constructed anew or improved to meet the requirements of the state board of health.

M	loni	hly Report of			County
		to the	_		
	S	TATE BOARD OF	F	H	EALTH
		February 1920)		
EDUCATIONAL		QUARANTINE			NURSES' REPORT (General)
Public meetings	10	Cases quarantined	1	81	Number on duty
Attendance	727	Whooping-cough	_		Lectures
Letters sent	-	Measles-German Measles	2	8	Attendance
News articles (original)	5	Diphtheria-S.S. throat	1		Office visits
News articles (press)		Smallpox-Chickenpox	17	29	Assistance to H.O hours
Office conference, hours	8	Typhoid-Para typhoid	2		News articles
Pieces of literature		C.S.Meningitis-Inf. paralysis	I		Letters sent
SOIL POLLUTION	V	Trachoma-Ophthal. neonat.			INFANT HYGIENE
Sanitary privies, rural	317	Venereal disease			Clubs organized
Sanitary privies, towns		Scarlet fever	1	1	Clubs visited
Specimens, stools examined	1	Influenza			Demonstrations
Having hookworm		Whooping-cough			Conferences, personal
Treatments given		Measles-German Measles	19		Cases visited-mother
Cured of hookworm	22	Diphtheria-S.S. throat	1		Cases visited-child
Workers employed		Smallpox-Chickenpox	6	13	Midwives instructed
Days worked, total		Smallpox-Chickenpox Typhoid-Para typhoid	X		Furnished silver nitrate
Water supplies improved		C.S.Meningitis-Inf. paralysis			Schools visited
SCHOOLS		Trachoma-Ophthal. neonat.			Children examined
		Venereal disease			Ref. to S.B.H. for prenatal letters
Schools visited	14	Scarlet fever		1	Ref to S.B.H for diet cards
Cards received	793	LIFE EXTENSION			Ref to S.B.H for preschool advice
Children examined	105	Applications received	12	23	Sanitary privies
Children treated	2	Examinations made	+-	25	TUBERCULOSIS
Sanitary privies installed	2	Midwives instructed	+	=	
Physical exam teachers	12	COUNTY DEPENDEN	TS	\exists	New cases
DISPENSARIES		Visits to county home 1		\dashv	Visits made, instructive
Vaccinations, typhoid			+	-	Visits made, nursing
** smallpox	305	Visits to county jail	-	3	Demonstrations
" whooping-cough		Visits to convict camps	+	1	Conferences, personal
· CITY (Special)		Patients treated	-		Sent to physician
Inspections, hotels, etc.	6	Treatments given	-	_	Discharged to sanatorium
Dairy Inspections		Lunacy examinations	-	4	Discharged cured
Milk examinations	\sqcap	Physical exam. prisoners		3	Home care only
Sewer connections	3				Remarks
Special investigatons	2			-	
Nuisances abated	H				
-	\vdash				

Fig. 79.—Statistical summary of work of county health department for one month. Indicates range of activities undertaken. Southern States

ACTIVITIES OF COUNTY HEALTH DEPARTMENTS

Fig. 79, page 195, gives a concise statistical summary of the activities of a typical county health department for the month of February, 1920. During the same month there were seventy other county health departments in twelve Southern States engaged in similar activities. It will be seen that attention centers in the prevention of soil pollution and its attending diseases, such as typhoid fever, infant diarrhea, the dysenteries, and hookworm; in life extension work; in the medical inspection and treatment of school children; the quarantine of infectious diseases; the prevention of tubercu-

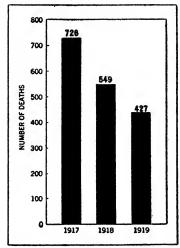


Fig. 80.—Deaths from typhoid fever in North Carolina, 1917 to 1919

losis; and in infant welfare. Effort is made to stress the fundamental principles of healthful living, to develop an accurate system of reporting vital statistics, and to establish at least the nucleus of a public health laboratory service.

Prevention of Soil Pollu-This phase of the work seeks primarily to secure the installation and use of a sanitary latrine at every home. Inspectors of the health department visit the homes throughout the county, make sanitary inspections, and leave behind them plans and specifications for approved latrines. The inspectors later repeat their visits to observe whether the improvement recommended has been made. Their task is simplified in states or communities where

there are ordinances requiring the use of latrines; here the inspectors merely see that the law is enforced. The activities against soil pollution also include the making of examinations for hookworm disease and the treatment of those who are found to be infected.

Medical Inspection and Dental Service for Rural Children. The school children of the county are medically inspected in order to obtain a record of the physical condition of every child and treatment for those who need it. The teachers insert on the record card for each child the date of birth, age on entering school, grades repeated (if any), history of diseases in family, the child's height, weight, and chest expansion, the condition of his teeth, eyes, ears, and throat, and the

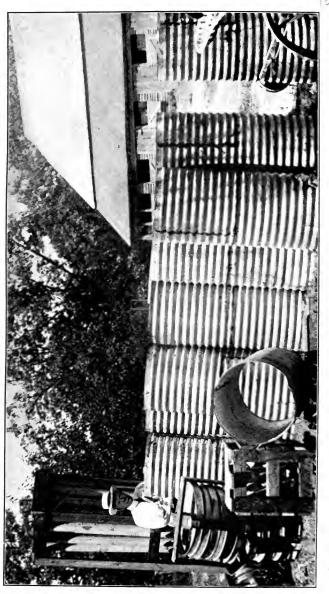


Fig. 81.—Preventing pollution of the soil is a leading feature of county health work. Corrugated iron lining for pit latrines, adopted for use in Grenada county, Mississippi. In soils with ground-water level near the surface it is necessary to line the pits

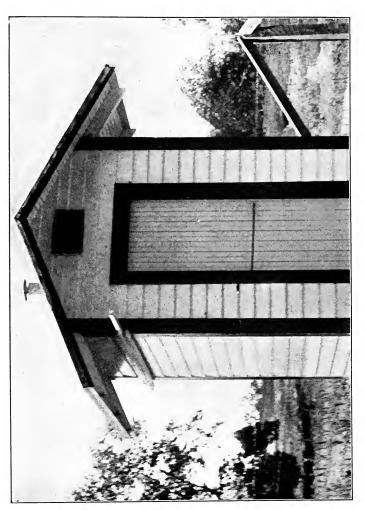


Fig. 82.—Inexpensive superstructure erected over lined pit. Grenada county, Mississippi

state of his nutrition. The completed cards are then transmitted to the health officer, who carefully considers each case and examines every child whose card indicates it to possess a remediable defect or abnormality. The examination is made preferably in the presence of the parents, so that the health officer may discuss with them the advisability and the best methods of having the child treated.

The health departments make special effort to educate parents regarding the dangers of dental defects in their children and to impress upon them the importance of having these defects remedied. Traveling dental clinics are provided for rural school

children. The great majority of the patients reached by this service are very young children who have never before visited a dentist.

Infant Welfare. This division of the work seeks to lower the death rate among babies and young children by systematically instructing mothers in the principles of infant and child hygiene. The nurse who conducts this unit of work holds clinics at the health office and at other places throughout the county, and gives a course of intensive study to clubs and other women's organizations. Literature for the study course is provided by the state board of health. A clinic conducted by the health officer concludes the course. The nurse arranges to meet the club once a month thereafter for the discussion of community health conditions and for consultations with mothers. She endeavors to give personal instruction to all expectant mothers, to mothers of bottle-fed babies and of babies with diarrhea, and to persons

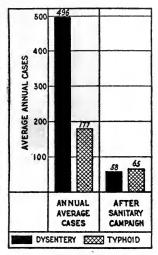


Fig. 83.—Reduction in average annual number of cases of dysentery and typhoid. Situation in Troup county, Georgia, before and after inauguration of county health work compared

living in homes where tuberculosis exists. She is also charged with supervising and instructing midwives.

Life Extension. The life extension work has proved very popular and has served as a means of enlisting the interest and co-operation of influential citizens. It consists of making thorough physical examinations of adults. The work is intended primarily for persons who are well, and its object is to keep them at their highest state of efficiency. Periodic medical examinations will often detect latent or incipient impairments in health, find minor defects which injure the citizen and decrease his working capacity, and so make it possible

for him to secure medical attention before the condition becomes serious or permanent. The examinations, which include urine and blood-pressure tests, are made in the health office. Treatment is never given. If medical or surgical attention seems advisable, the

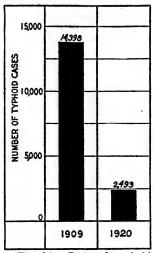


Fig. 84.—Cases of typhoid fever in Virginia, 1909 compared with 1920

patient chooses his own physician. Each person receives, however, oral and printed advice and appropriate health literature.

Control of Communicable Diseases. This is effected through the state quarantine law, which usually requires the attending physician or the householder to report acute infectious diseases. The health department, upon receiving these reports, sends literature on the disease to the householder and to the school teacher in the district wherein the home is located; and the health officer visits the homes of as many as possible of the cases to give personal instruction in the means of preventing the spread of the disease. Usually the county health office keeps a record of each case reported, transmits notices and detailed monthly reports to the epidemiologist of the state board of health, submits to the newspapers

monthly articles on the quarantine work of the county, and publishes in the papers the name and address of each case of communicable disease reported.

EDUCATING THE PUBLIC IN HEALTHFUL LIVING

The work of the county departments always stresses the educational phase. The health officer and his assistants try to present the facts of public hygiene and sanitation in such way that they may benefit every citizen in the county. Lectures and demonstrations, newspaper articles, literature, clinics, and consultations in house-to-house visits form the main channels through which the public is reached. The schools invariably receive special attention, catechisms and similar material on hygienic topics being frequently prepared for use in them. In certain southern counties, as a result of health teaching, the schools have formed organizations to look after the sanitary condition of the school district and to make reports to the health officer.





Fig. 85.—Anti-plague work, Beaumont, Texas: to the left, rat catcher starting out on daily rounds; to the right, rat catchers returning with their catch. A special activity of a Texas county health department

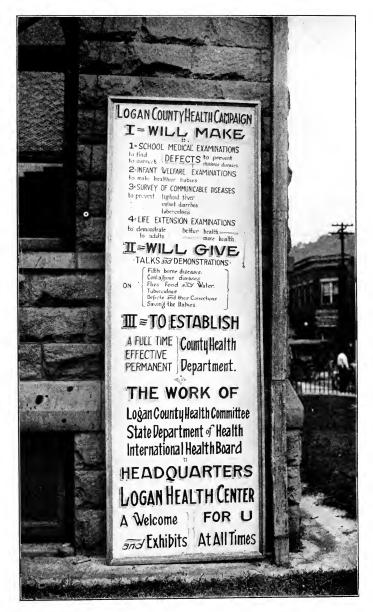


Fig. 86.—Advertising the county health department. Sign board displayed at Logan, the county seat of Logan county, West Virginia

Other publicity devices which have been used with much success consist of health slogans painted on mileposts on the county highways, of weekly bulletins distributed through the county, of letter seals for the use of the department of health, and of exhibits at the county fairs. When the milepost sign is used, two advertisements on each post defray the cost of erecting the posts. In certain instances a contest is held to secure effective sentences for use as slogans. When this is done the business men of the county sometimes agree to furnish the necessary prizes; and men, women, and children in every part of the county take part in the contests. By means of the signs it is possible not only to foster county pride and spirit, to aid visitors, and to advertise the merchants of the county, but also

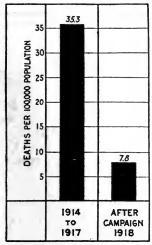


Fig. 87.—Deaths per hundred thousand from typhoid fever, before and after inauguration of county health work. Nine North Carolina counties

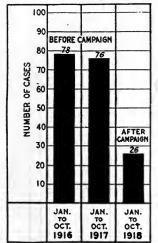
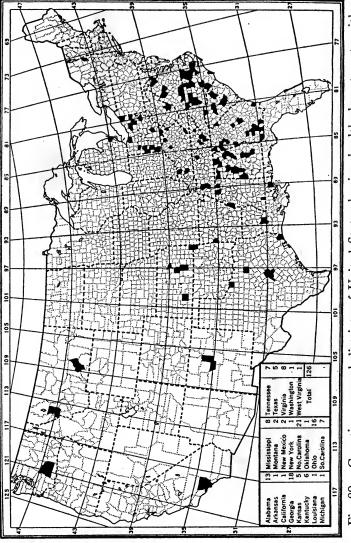


Fig. 88.—Comparison of typhoid cases before and after county health work. Wicomico county, Maryland

to drive home through repetition the need of preventing disease and the methods by which this may be accomplished.

REDUCTION IN INCIDENCE OF DISEASE

The most direct evidence of the effectiveness of county health work is to be found in the lowering of sickness and death rates. In North Carolina the number of cases of typhoid fever was reduced from 726 in 1917 to 427 in 1919. This represents a decrease from 29.6 to 16.9 per 100,000 in the typhoid death rate. For each death from typhoid fever it is estimated that there are on the average ten cases, and each case is



On December 31, 1920, there were 126 of these Fig. 89.—Counties or rural districts of United States having health departments with whole-time health officer in charge. departments in the country

estimated to cause a loss to the state of not less than \$400. In Monroe county, Mississippi, where 8,465 persons were inoculated for typhoid fever between 1918 and 1920 and a total of 1,811 sanitary privies were installed during the same period, the typhoid cases in 1920 numbered 89.8 per cent less than in 1917. Figs. 27, 80, 83, 84, 87, and 88, pages 115 and 196 to 203, depict graphically the reduction in various diseases that has occurred in states in which county health work has been conducted.

EXTENSION OF WORK TO OTHER STATES

The plan of work in operation in the Southern States is applicable to other sections as well. It is, in fact, already being adopted by states in other sections. There were in the country on December 31, 1920, not less than one hundred twenty-six rural counties or districts having county health departments each with a whole-time health officer (Fig. 89, page 204). Kansas and New Mexico are among the latest states to establish such departments.

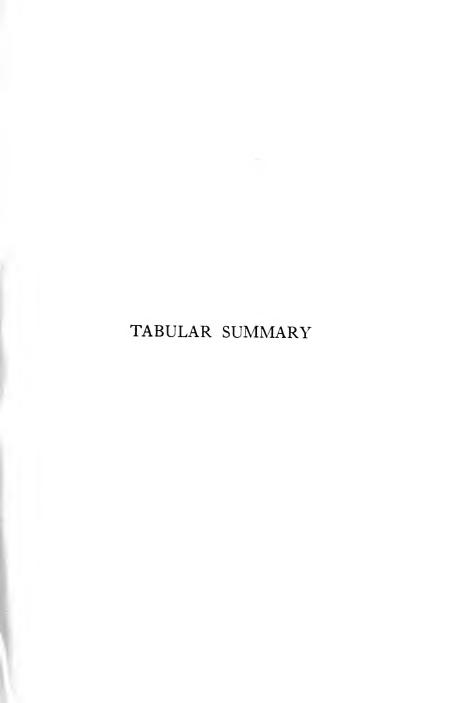


TABLE 1: All Countries—Persons Enumerated in Census, Microscopically Examined, Found Infected, Given First Treatment, and Cured of Hookworm Disease in Areas Completed during 1920, Figures Excluded for Areas in Which Work Was Still in Progress by Geographical Regions.

F	Per Number	
		:
	:	
5,688 16,067 78,580 84,406	99.1 85.2 91.5	

¹ During 1920, in the Southern States, the main emphasis in work against soil pollution diseases was placed on the building and improving of latrines.

² Some of the persons treated were found infected during 1919.

³ In Central America the bulk of the work is by the dispensary plan. This does not afford opportunity for frequent re-examinations to determine cure. Consequently the percentage of persons known to be cured is low in comparison with that for other regions.

In Ceylon, throughout 1920, estate laborers were assumed to be infected, and accordingly were given first treatment without preliminary microscopic diagnosis. This explains the blank spaces for "Census," "Microscopically Examined," and "Found Infected" in the lines for "The East" and "Total."

TABLE 2: Southern States-Persons Enumerated in Census, Microscopically Examined, Found Infected, Given First Treatment, and Cured of Hookworm Disease in Areas Completed during 1920, by States. Figures Excluded for Areas in Which Work Was Still in Progress¹

	e	Per Cent	.3	1.2 3. 25.0 67.7 100.0
	CURED	Number	22	8 ; R; B
633	N T TENT	Per Cent	:	100.0 100.0 71.4 75.0 100.0
Sol T was	GIVEN FIRST TREATMENT	Number	6,471²	516 236 4,452 1,2373 20 9
200	TED	Per Cent	29.2	75.6 59.4 31.9 17.0 4.3 4.7
Je in the property of the state	FOUND INFECTED	Number	5,688	381 236 4,452 578 28 12 12
1000	O-NED	Per Cent	:	39.0 6.5 55.0 10.8
	Micro- scopically Examined	Number	19,460	504 397 13,943 3,408 644 257
	Census			35,724 9,928 467 2,839
0	State		Total	Alabama. Georgia. Mississippi South Carolina. Tennessee. Texas. Virginia.

¹ During 1920, in the Southern States, the main emphasis in work against soil pollution diseases was placed on the building and improving of latrines.

2 Some of the persons treated were found infected during 1919.

*Less than one-tenth of one per cent.

TABLE 3: West Indies—Persons Enumerated in Census, Microscopically Examined, Found Infected, Given First Treatment, and Cured of Hookworm Disease in Areas Completed during 1920, by Countries. Figures Excluded for Areas in Which Work Was Still in Progress

AGMENTO	Census	MICRO- SCOPICALLY EXAMINED	O- LLLY NED	FOUND INFECTED	OD TED	GIVEN FIRST TREATMENT	r ENT	CURED	Q
141,000		Number	Per Cent	Number	Per Cent	Number Cent	Per Cent	Number	Per Cent
Total	29,138	28,890	99.1	16,067	55.6	15,274	95.1	12,867	84.2
Jamaica	13,889	13,748	0.66	3,915 28.5	28.5	3,605	92.1	3,203	88.8
St. Lucia	6,401	6,373	9.66	4,743 74.4	74.4	4,656	98.2	4,261	91.5
Trinidad	8,848	8,769	99.1	7,409	7,409 84.5	7,013 94.7	94.7	5,403	0.77

TABLE 4: Central America—Persons Enumerated in Census, Microscopically Examined, Found Infected; Given First Treatment, and Cured of Hookworm Disease in Areas Completed during 1920, Figures Excluded for Areas in Which Work Was Still in Progress by Countries.

Convers	CENETR	MICRO- SCOPICALLY EXAMINED	O- LLLY NED	Found Infected	D TED	GIVEN FIRST TREATMENT	r ENT	CURED1	10
		Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
Total	164,654	140,318	85.2	78,580	56.0	67,963	86.5	31,093	45.7
Costa Rica Guatemala Nicaragua Panama	43,134 22,887 45,160 14,392 39,081	36,454 21,460 33,128 13,104 36,172	84.5 93.8 73.3 91.1	10,743 12,805 25,272 10,050 19,710	29.5 59.7 76.3 76.7 54.5	8,966 11,429 22,035 8,353 17,180	83.5 89.3 87.2 83.1 87.2	4,768 6,777 8,395 4,009 7,144	53.2 59.3 38.1 48.0

This does not afford opportunity for frequent Consequently the percentage of persons known to be cured is low in comparison ¹ In Central America the bulk of the work is by the dispensary plan. re-examinations to determine cure.

with that for other regions.

TABLE 5: South America—Persons Enumerated in Census, Microscopically Examined, Found Infected, Given First Treatment, and Cured of Hookworm Disease in Areas Completed during 1920, Figures Freluded for Areas in Which Work Was Still in Promess hy Countries.

of countries. I that is executed for Aleas in Which Work Was Sim it I togless.	verunea jo	י שונתי ו	ווי או וויי	SID MA	C CD AA	I T MA AAAA	ogress.		
STATE AND COUNTRY	CENSUS	Micro- scopically Examined	O- NED	FOUND INFECTED	D	GIVEN FIRST TREATMENT	r ENT	Сикер	ρ
		Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
Total	120,366	110,192	91.5	84,406	76.6	74,400	88.1	49,330	66.3
Brazil	112,488 18,163 12,563 24,506 31,897 25,359 7,878	103,329 16,961 11,534 22,410 ¹ 28,814 ² 23,610 6,863	91.9 93.4 91.8 91.4 90.3 87.1	78,363 11,579 5,068 17,329 25,626 18,761 6,043	75.8 68.3 43.9 77.3 88.9 88.1	68,706 10,583 4,632 14,486 22,672 16,333 5,694	87.7 91.4 91.4 83.6 88.5 87.1	44,977 5,179 2,866 9,391 15,471 12,070 4,353	65.5 48.9 61.9 64.8 68.2 73.9 76.4

¹ Includes 3,178 not required to submit specimens but examined for treatment.
² Includes 7,011 not required to submit specimens but examined for treatment.

TABLE 6: The East—Persons Enumerated in Census, Microscopically Examined, Found Infected, Given First Treatment, and Cured of Hookworm Disease in Areas Completed during 1920, by Figures Excluded for Areas in Which Work Was Still in Progress Countries.

Country	CENSUS	MICRO- SCOPIGALLY EXAMINED	O- NED	FOUND INFECTED	AD TED	GIVEN FIRST TREATMENT	N T ENT	CURED	Q
		Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
Total 1	:	:	:	:	:	128,459	:	96,316	75.0
Australia Ceylon¹ Seychelles Siam	5,190 1,529 23,091	5,008. 1,525 12,591	96.5 99.7 54.5	350 .902 10,216	7.0 59.1 81.1	345 117,337 853 9,924	98.6 94.5 97.1	305 95,302 685 24	88.4 81.2 80.3 0.2

¹ In Ceylon, throughout 1920, estate laborers were assumed to be infected, and accordingly were given first treatment without preliminary microscopic diagnosis. This explains the blank spaces for "Census," "Microscopically Examined," and "Found Infected" in the lines for "Ceylon" and "Total."

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FINANCIAL STATEMENT

TABLE 7: Expenditures of the International Health Board Covering its Activities During the Year 1920

FIELDS OF ACTIVITY	Amount Expended
Grand Total	\$1,658,269.66
RELIEF AND CONTROL OF HOOKWORM DISEASE MALARIA CONTROL YELLOW FEVER CONTROL. TUBERCULOSIS IN FRANCE. PUBLIC HEALTH EDUCATION. FIELD STAFF SALARIES, EXPENSES, ETC., NOT PRORATED TO SPECIFIC BUDGETS. MISCELLANEOUS. ADMINISTRATION.	623,804.86 132,118.67 139,757.40 518,013.51 68,553.35 25,917.60 58,632.07 91,472.20
ITEMIZATION BY STATES AND COUNTRIES RELIEF AND CONTROL OF HOOKWORM DISEASE	COD CO4 CC
Southern States West Indies Central America South America The East	623,804.86 144,201.84 62,025.73 97,304.00 206,425.84 113,847.45
Southern States \$144,201.84	
Administration 6,032.20 Alabama 17,256.72 Georgia 4,525.39 Kansas 4,494.00 Kentucky 16,599.03 Mississippi 20,709.72 New Mexico 957.04 North Carolina 10,463.00 South Carolina 17,210.63 Tennessee 13,533.22 Texas 14,723.99 Virginia 14,965.17 West Virginia 2,731.73	
West Indies	
Administration 6,039.23 British Guiana¹ 486.37 Dutch Guiana¹ 738.34 Jamaica 18,400.09 Porto Rico 7,823.35 Santo Domingo 1,077.07 St. Lucia 11,444.57 Trinidad 16,016.71	

¹ For administrative reasons, British and Dutch Guiana, although on the mainland of South America, are considered West Indian Colonies.

TABLE 7: Expenditures of the International Health Board Covering its Activities During the Year 1920— Continued

FIELDS OF ACTIVITY		AMOUNT EXPENDED
RELIEF AND CONTROL OF HOOKWO	RM DISEASE-	
Central America	\$97,304.00	
Administration	7,178.01	
Costa Rica.	20,219.60	
Guatemala	17,126.43	
Nicaragua	18,745.12	
Panama	20,061.02 $13,973.82$	
South America	206,425.84	
Brazil	193,560.95	
Colombia	12,864.89	
The East	113,847.45	
Administration	7,178.01	
Australia	35,417.31	
Borneo	3,106.23 34,154.28	
India	7,810.00	
Mauritius	5,688.56	
Seychelles Islands Siam	4,643.03 15,850.03	
MALARIA CONTROL		\$132,118.6
Southern States		121,652.24
Foreign Countries		10,466.4
	121,652.24	
Administration	6,032.20	
AlabamaArkansas	8,906.92 7,048.90	
Georgia	1,230.86	
Louisiana	30,699.94	
Mississippi	27,537.43	
North CarolinaSouth Carolina	7,526.13 13,942.74	
Tennessee	1,969.94	
Texas	11,472.34	
Virginia	5,284.84	
Foreign Countries	10,466.43	
Ecuador	4,595.59	
Nicaragua Porto Rico	425.66 5,445.18	

TABLE 7: Expenditures of the International Health Board Covering its Activities During the Year 1920— Continued

FIELDS OF ACTIVITY	AMOUNT Expended
YELLOW FEVER CONTROL	\$139,757.40
Epidemic work	23,539.03
Ecuador	28,574.98
Salvador Expenses of Investigating Commissions and salaries, expenses, etc., of Director and Asso-	3,926.26
ciates	83,717.13
TUBERCULOSIS IN FRANCE	518,013.51
Central Administration	86,310.57
Medical Division	80,226.08
Public Health Visitation	76,191.46
Educational Division	135,920.64
Departmental Organization	139,364.76
Public Health Education	68,553.35
Department of Hygiene—Faculdade de Medi- cina e Cirurgia de São Paulo	
Operating Expenses	30,143.51
Fellowships	38,409.84
Miscellaneous	58,632.07
Conference of State Health Officers	2,488.71
Conference of Malaria Workers	1,810.35
Czechoslovakia—Public Health Work	12,708.81
Drugs for Conserving Health of Field Staff	32.29
Express, Freight, and Exchange	557.85
Field Equipment and Supplies	5,996.96
Preservation of Powdered Milk Medical Examination of Applicants for Field	500.00
Staff	125.00
Motion Picture Film on Hookworm Disease	2,817.73
Pamphlets and Charts	5,873.33
clature of Causes of Death	615.30
Repainting Office at Salvador	75.00
Surveys and Exhibits	23,528.78
Massachusetts	1,467.27
Study of Teaching of Hygiene and Public Health in Medical Schools	34.69

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CHINA MEDICAL BOARD

Report of the General Director

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To the President of the Rockefeller Foundation: Sir:

I have the honor to submit herewith my report as General Director of the China Medical Board for the period of January 1, 1920, to December 31, 1920.

Respectfully submitted,

GEORGE E. VINCENT,

General Director.

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CHINA MEDICAL BOARD

In 1915 the Rockefeller Foundation organized the China Medical Board and entrusted to it the task of assisting in developing modern medicine in China in co-operation with existing Chinese and other agencies. The original plans called for the establishment and maintenance by the Board of one or possibly two medical schools; and the provision of funds for increasing the staffs, buildings, and equipment of a number of mission hospitals, for strengthening the premedical work of certain existing colleges and universities, and for advancing the training of Chinese and missionary physicians.

The more important activities pursued during the year 1920 were of substantially similar nature to those of preceding years, and included (1) carrying forward the construction work on the buildings of the new Peking Union Medical College; (2) providing instruction to the students enrolled in the medical school, pre-medical school, and nurses' training school of this institution; (3) aiding medical education and pre-medical education in unaffiliated institutions; and (4) providing funds for strengthening medical work in mission-

ary hospitals, for undertaking a small amount of translation of Western scientific terms into the Chinese language, and for assisting Chinese and mission doctors who were engaged in graduate study.

I. MEDICAL EDUCATION

A. The Peking Union Medical College

The wholly reorganized and greatly enlarged Peking Union Medical College is the China Medical Board's special contribution to the cause of medicine in China. The organization, maintenance, and extension of the facilities of this institution have been the outstanding achievement of the Board since its organization. Hand in hand with the reconstruction and enlargement of the physical plant has proceeded a complete reorganization of the teaching staff until the school as it stands today represents a practically new institution.

The terms by which the Union Medical College was acquired by the newly organized China Medical Board stipulated that the management of the college should be vested in a Board of Trustees consisting of thirteen members, one appointed by each of the six American and British missionary organizations previously maintaining the college, and seven by the Rockefeller Foundation. (For the composition of this Board, see page 226.) During 1920 the administration of details continued, as in 1919, to be vested in the local Administrative Board (see page 227) representing the different departments of the school.

BOARD OF TRUSTEES, PEKING UNION MEDICAL COLLEGE (IN NEW YORK)

Chairman
Paul Monroe

Vice-Chairman
J. Auriol Armitage

Secretary
EDWIN R. EMBREE

Assistant Secretary
MARGERY K. EGGLESTON

Executive Committee George E. Vincent, Chairman

Arthur J. Brown Wallace Buttrick Simon Flexner Frank Mason North

Members

To serve until the Annual Meeting of 1923

Arthur J. Brown Wallace Buttrick James Christie Reid George E. Vincent

To serve until the Annual Meeting of 1922

F. H. Hawkins Paul Monroe Frank Mason North William H. Welch

To serve until the Annual Meeting of 1921

J. Auriol Armitage James L. Barton Simon Flexner Robert H. Kirk

John R. Mott

These members have been elected as follows:

By the Rockefeller Foundation

Wallace Buttrick Simon Flexner Robert H. Kirk John R. Mott Paul Monroe George E. Vincent

William H. Welch

By the London Missionary Society F. H. Hawkins

By the Medical Missionary Association of London James Christie Reid

By the American Board of Commissioners for Foreign Missions
James L. Barton

By the Society for the Propagation of the Gospel in Foreign Parts
J. Auriol Armitage

By the Board of Foreign Missions of the Methodist Episcopal Church Frank Mason North

By the Board of Foreign Missions of the Presbyterian Church in the United States of America Arthur J. Brown

ADMINISTRATIVE BOARD, PEKING UNION MEDICAL COLLEGE (IN PEKING)

Chairman
Henry S. Houghton, ex-officio

Vice-Chairman Roger S. Greene

Secretary
J. Preston Maxwell

Executive Committee

Henry S. Houghton, Chairman, ex-officio Roger S. Greene, ex-officio Donald E. Baxter, ex-officio Franklin C. McLean William Warren Stifler

Members, ex-officio

Donald E. Baxter Edmund V. Cowdry Alvert Menzo Dunlap Roger S. Greene Henry S. Houghton Harvey James Howard John H. Korns Bernard E. Read William Warren Stifler Philip Allen Swartz

Anna Dryden Wolf

Certain changes in the functions and composition of the Administrative Board appeared to be desirable, and one accomplishment of 1920 was the adoption of a plan of reorganization to go into effect in 1921. The points emphasized in the new plan are: separation of educational and administrative affairs; recognition of the principle of full representation of all divisions of the work; and the creation, in the interests of efficiency, of two small executive bodies with the Director acting as a medium of communication between Trustees and college administrative units.

At the annual meeting of the Trustees in April, 1920, Dr. Franklin C. McLean tendered his resignation as Director of the College and was succeeded on December 28, 1920, by Dr. Henry S. Houghton, who has been connected since 1916 with the work of the China Medical Board. Dr. McLean retained his connection with the College as professor and head of the department of medicine. Dr. Richard M. Pearce, Director of the Division of Medical Education of the Rockefeller Foundation, sailed for China in September to spend a year at the Peking school in an advisory capacity. On Dr. Houghton's return to the United States to attend the special meeting of the Peking Trustees held December 28, 1920. Dr. Pearce was appointed interim Acting Director.

PLANT. The new buildings for the medical school occupy a large tract in the heart of the Republic's capital which was formerly the site of the palace of a Manchu prince. Gray brick has been used in the fourteen buildings which comprise the group, the basic construction being of a simple, substantial type. The predominant architectural note is Chinese, with scarlet pillars, jade green, glazed tile roofs, and painted eaves, after the manner of palaces of Chinese princes. The buildings and equipment have been designed to offer both elementary and advanced instruction in the medical sciences, in the clinical branches, and in hospital training.

The medical school unit—comprising the anatomy, physiology, and chemistry buildings—was opened in the fall of 1919. During 1920 progress in construction brought to completion the pathology and hospital administration buildings, the nurses' home, the stores department and power plant, the admissions and ward buildings, the animal house, and the service court. The exterior construction of the auditorium was completed but no work was done on the interior: this will probably be the last building to be finished. At the close of 1920 the out-patients' and private patients' units required but a few more months' work, and the hospital will be ready for occupancy during 1921. The week of Septem-

ber 15-22, 1921, has been set for the dedication of the College.

Two large compounds belonging to the school contain residences for the faculty and staff. The buildings—of brick and concrete, with slate roofs—are fitted with Western conveniences and are suitable for foreign occupancy. The fourteen new residences in the south compound were completed in the fall of 1918, while the entire north compound was ready for occupancy at the end of 1920.

One of the buildings which formerly housed the old Union Medical College has been utilized, with some remodeling, for the pre-medical school with its three-year course preparatory for the medical department, and another—the original men's hospital—for clinical work pending the completion of the new general hospital.

Work of the School: Instruction. The course of study for the first year of the medical school, adopted for 1919-1920 and the following years, includes a total of between twenty-eight and thirty-three hours a week during three terms, spent on anatomy, Chinese (scientific), embryology and histology, English, French or German, physiology, and physiological chemistry. The second year course of study, first offered for the

¹ A report on the work of the pre-medical school is to be found under Pre-Medical Education, page 255.

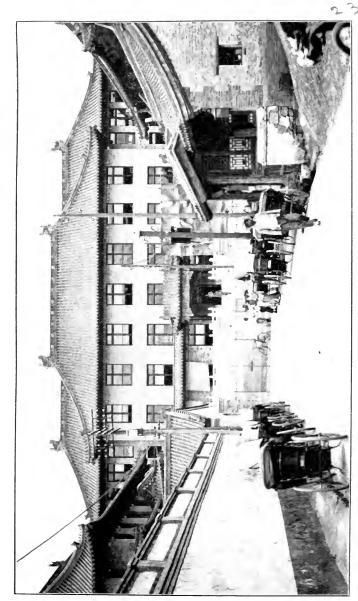


Fig. 90.—Entrance to hospital and nurses' home showing native Chinese buildings in foreground

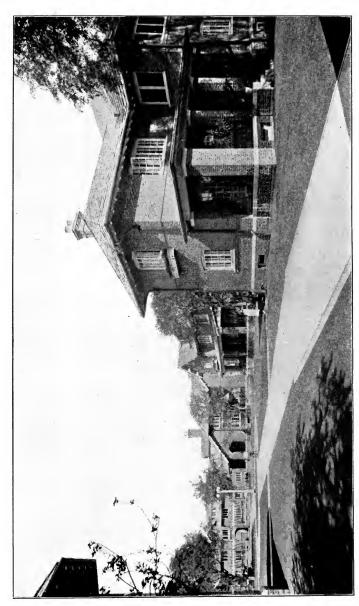


Fig. 91.—North residence compound which contains residences for sixteen families

year 1920-1921, includes from twenty-five to thirty-three hours a week divided among bacteriology, Chinese (scientific), English, French or German, hygiene, neurology, parasitology, pathology, pharmacology, pharmacy, physical diagnosis, physiology, and therapeutics. The following summary gives in tabular form a list of the subjects studied during the first and second years:

COURSES OFFERED IN THE MEDICAL SCHOOL

		FIRST YEAR	t.		
First Trimester Anatomy Histology and	Hours per week 15	Second Trimester Anatomy Histology and	Hours per week	Third Trimester	Hours per week
Embryology Physiology English	9 6 2	Embryology English Physiological Chemistry	9 2 7	Physiology English Physiological Chemistry French or German Scientific Chinese	12 2 9
Total hours	32	Total hours	33	Total hours	28
		SECOND YEA	.R		
First Trimester Neurology Pharmacy	Hours per week 8 1	Second Trimester	Hours per week	Third Trimester	Hours per week
Bacteriology English Scientific Chinese	14 1 1	English	I		
		Physiology Pharmacology Pathology Parasitology	8 9 9	Pharmacology Pathology	11 9
		French or German	5	French or German Hygiene Therapeutics Physical Diagnosis	1 3 2 2
Total hours	25	Total hours	33	Total hours	28

Each class of the three schools—the medical college, the pre-medical school, and the school for nurses—has capacity for approximately twenty-five students. The enrolment for 1919-1920 reached forty-three, of whom seven were registered in the first year class of the medical school, two as graduate students, and thirty-four in the classes of the pre-medical school. The 1920-1921 enrolment was seventy-nine, of whom thirteen were registered in the two classes of the medical school, seven as special students, and fifty-nine in the pre-medical school.

Research and Work in Special Fields. In view of the fact that the college is just beginning its work in the new buildings, any extended account of the scholarly work of the institution is deferred for future reports.

Hospital. The progress made with construction work on the new hospital indicates that the last of the buildings will probably be completed in June. The hospital will have a total bed capacity of 250. It is not expected that all the beds will be opened until the classes become larger than at present. Pending the completion of the new hospital building, the original men's hospital on the Hsinkailu has been kept open and the clinical members of the staff have conducted activities there. Dr. Howard and Dr. Li have conducted eye clinics throughout the

year, and the ear, nose, and throat work has been under the direction of Drs. Dunlap and Jui-hua Liu. During the fighting near Peking in the summer of 1920, between sixty and seventy wounded soldiers were accommodated in the hospital. Dr. George Y. Char, who, with Dr. Jui-heng Liu, performed most of the operations on the soldiers, invented several ingenious contrivances to increase the comfort of the patients and to facilitate attention to their wounds.

Nurses' Training School. Three Chinese students were enrolled at the opening of the Training School for Nurses, September 28, 1920. The innovation of training women nurses for general hospital service, including work in the men's wards, is being undertaken with caution. Some male Chinese nurses will continue to be employed pending the gradual establishment of the new system.

Religious and Social. The department of religious and social work, in charge of Rev. Philip A. Swartz, has conducted a regular program, including physical training, religious meetings, Bible study, and chapel service. The religious and social activities are purely voluntary and are conducted under the auspices of the Students' Christian Association.

The Men Nurses' Christian Association is organized upon lines similar to the Students' Chris-

tian Association, the chief difference being the general use of the Chinese language. Another body recently organized is the Students' Association, which aims to care for the athletic, social, and literary interests of students in the College and Pre-medical School.

Personnel. At the end of December, 1920, the following persons composed the faculty of the Peking Union Medical College:

THE MEDICAL SCHOOL

- Henry Spencer Houghton, Ph.B., M.D., Acting Director. Ohio State University, Ph.B., 1901. Johns Hopkins Medical School, M.D., 1905. Formerly dean and professor of tropical medicine, Harvard Medical School of China.
- Franklin C. McLean, B.S., M.S., Ph.D., M.D., Professor and head of the department of medicine. University of Chicago, B.S., 1907; M.S., 1912; Ph.D., 1915. Rush Medical College, M.D., 1910. Assistant resident physician, Hospital of the Rockefeller Institute, 1914-1916. Director, Peking Union Medical College, July 1, 1916, to April 30, 1920.
- Edmund V. Cowdry, A.B., Ph.D., Professor and head of the department of anatomy. University of Toronto, A.B., 1909. University of Chicago, Ph.D., 1912. Associate in anatomy, Johns Hopkins University, 1913-1917.
- Harvey James Howard, A.B., A.M., M.D., D.Oph., Professor and head of department of ophthalmology. University of Michigan, A.B., 1904. University of

- Pennsylvania, M.D., 1908. Formerly in charge of eye, ear, and nose department, Canton Christian College.
- Adrian Stevenson Taylor, M.D., Professor and head of the department of surgery. Universities of Alabama and Virginia. University of Virginia, M.D., 1905. Formerly in charge of Southern Baptist Hospital, Yangchow, China.
- Ralph Garfield Mills, A.B., M.D., Professor and head of the department of pathology. University of Illinois, A.B., 1903. Northwestern Medical College, M.D., 1907. Formerly director of department of research, Severance Union Medical College, Seoul, Korea.
- Davidson Black, M.B., A.B., Professor of embryology and neurology. University of Toronto, M.B., 1906; A.B., 1909. Formerly assistant professor of anatomy, Western Reserve Medical School.
- J. Preston Maxwell, B.S., M.B., M.D., L.R.C.P., F.R.C.S., Professor and head of the department of obstetrics and gynecology. University of London, B.S., M.B., 1898; M.D., 1910. Formerly in charge of Yungchun Hospital, Fukien.
- Albert Menzo Dunlap, A.B., M.D., Associate professor of otology, rhinology, and laryngology, and dean. University of Illinois, A.B., 1906. Harvard Medical School, M.D. Formerly professor of otology, rhinology, and laryngology, and chief of out-patient department, Harvard Medical School of China.
- Bernard E. Read, Ph.C., M.S., Associate professor of physiological chemistry. Yale University, M.S., 1918. Connected with Union Medical College, Peking, 1909-1916.

- Oswald H. Robertson, B.S., M.S., M.D., Associate professor of medicine. University of California, B.S., 1910; M.S., 1911. Harvard Medical School, M.D., 1915. Formerly assistant in pathology and bacteriology, Rockefeller Institute for Medical Research.
- Andrew H. Woods, A.B., M.D., Associate professor of neurology and psychiatry. Washington and Lee University, A.B., 1893. University of Pennsylvania, M.D., 1898. Formerly connected with Canton Hospital and Canton Christian College.
- Carl TenBroeck, A.B., M.D., Associate professor of bacteriology. University of Illinois, A.B., 1908. Harvard Medical School, M.D., 1913. Assistant in comparative pathology, Harvard Medical School, 1913–1915. Assistant, later associate, in department of animal pathology, Rockefeller Institute, Princeton, 1915–1920.
- Ernest W. H. Cruickshank, M.B., D.Sc., Associate professor of physiology. University of Aberdeen, M.B., 1910. University of London, D.Sc., 1919. Carnegie Research Fellow, Institute of Physiology, University College, London, 1911-1915.
- H. Jocelyn Smyly, A.M., M.D., B.Ch., L.M., F.R.C.S., I., Associate in medicine. Trinity College of Dublin University, undergraduate and medical work. Appointed to Union Medical College faculty under former management in 1913.
- Charles W. Young, B.S., M.D., Associate in medicine. University of Illinois, B.S., 1897. Johns Hopkins Medical School, M.D., 1903. Connected with the Union Medical College under former management from 1906, for several years dean.



Fig. 92.—Soldiers wounded in the summer of 1920 being cared for at the College hospital

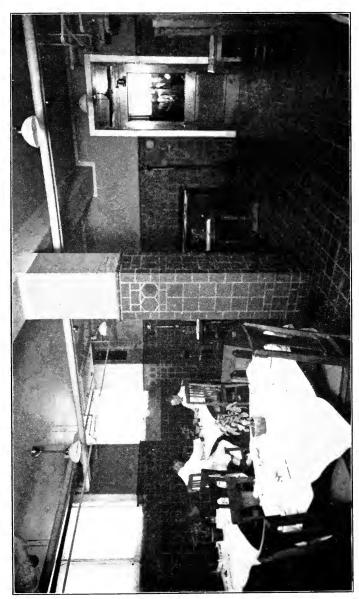


Fig. 93.—Dining room for hospital resident staff, in private patients' pavilion

- John H. Korns, A.B., A.M., M.D., Associate in medicine. Ohio Wesleyan University, A.B., 1904. Rush Medical College, M.D., 1909. Appointed to Union Medical College faculty under former management in 1915.
- William G. Lennox, A.B., M.D., Associate in medicine. Colorado College, A.B., Harvard Medical School, M.D. Formerly instructor in medicine and assistant physician, Union Medical College, Peking.
- Tsing-meu Li, M.D., Associate in ophthalmology. Oahu College, Honolulu, T.H. St. John's University, Shanghai, School of Medicine. University of Pennsylvania, M.D., 1909. Formerly on staff of Hunan-Yale Hospital.
- Jui-heng Liu, B.S., M.D., Associate in surgery. Harvard University, B.S., 1910; M.D., 1913. Formerly connected with Red Cross General Hospital, Shanghai.
- Edgar T. H. Tsen, M.D., Associate in bacteriology.

 Boone University, Wuchang; Harvard Medical
 School of China, M.D., 1914. Postgraduate work
 at Harvard Medical School, Boston, and College of
 Physicians and Surgeons, Columbia University.
- Paul C. Hodges, B.S., M.D., Associate in roentgenology. University of Wisconsin, B.S., 1915. Washington University School of Medicine, M.D., 1918. School of Roentgenology, Camp Greenleaf, 1918. Formerly photomicroscopist to department of surgery, Washington University School of Medicine.
- Hartley C. Embrey, A.B., M.S., Associate in physiological chemistry. University of Nashville, A.B., 1907. University of Chicago, M.S., 1915. Head of department of science, Central High School, Chattanooga,

- Tennessee, 1917-1918. Experimental work with DuPont Company, 1918-1919.
- Ernest Carrol Faust, A.B., A.M., Ph.D., Associate in parasitology. Oberlin College, A.B., 1912. University of Illinois, A.M., 1914; Ph.D., 1917. Instructor in zoology, University of Illinois, 1917-1919.
- Samuel R. Detwiler, A.M., Ph.B., Ph.D., Associate in anatomy. Yale University, Ph.B., 1914; A.M., 1916; Ph.D., 1918. Yale University, laboratory instructor in biology, comparative anatomy, embryology, plant morphology, 1913-1916. Yale School of Medicine, instructor in anatomy, 1917-1920.
- Frank Meleney, A.B., M.D., Associate in surgery. Dartmouth College, A.B., 1910. College of Physicians and Surgeons, Columbia University, M.D., 1916. Instructor in surgery, Presbyterian Hospital and College of Physicians and Surgeons, New York, 1919–1920.
- Alice H. Cook, A.B., M.D., Associate in otology, rhinology, and laryngology. Mt. Holyoke College, A.B., 1908.
 Woman's Medical College of Philadelphia, M.D., 1913. Demonstrator of otology and anatomy, and instructor in clinical rhinology, laryngology, and otology, Woman's Medical College of Philadelphia, 1919-1920.
- Henry E. Meleney, A.B., M.D., Associate in pathology. Dartmouth College, A.B., 1909. College of Physicians and Surgeons, Columbia University, M.D., 1915. Resident pathologist, Presbyterian Hospital, New York, and instructor in pathology, College of Physicians and Surgeons, Columbia University, 1919-1920.
- S. Y. Wong, B.S., M.S., Associate in physiological chemistry. University of Chicago, B.S., 1916; M.S., 1917.

- Jui-hua Liu, M.D., Assistant in otology, rhinology, and laryngology. Anglo-Chinese College, Tientsin.
 Pei-yang Medical College, Tientsin, M.D., 1915.
 Postgraduate work, Harvard Medical School, 1917–1918; New York Eye and Ear Infirmary, 1918–1919.
- Richard H. P. Sia, B.S., M.D. Assistant in medicine. Boone University, Wuchang, B.S., 1914. Western Reserve University, M.D., 1918. House and admitting officer, Cleveland City Hospital. Assistant resident in medicine, Peking Union Medical College, July, 1919-July, 1920.
- Robert Spencer Stone, A.B., Assistant in anatomy. Completed seven-year course in biology and physiology, University of Toronto, June, 1919, including first two years of medical course.
- Arthur Waitak Woo, M.B., B.S., M.R.C.S., L.R.C.P.,
 Assistant in obstetrics and gynecology. University
 College, London, M.R.C.S., L.R.C.P., 1913. Formerly obstetric and gynecological house surgeon,
 Middlesex Hospital, London.
- George Y. Char, B.S., M.D., Assistant in surgery. Boone University, Wuchang, B.S., 1909. Harvard Medical School of China, M.D., 1914. Postgraduate study at Harvard Medical School, Boston City Hospital, New York Polyclinic Hospital, and hospital of the Rockefeller Institute. Resident urologist, Long Island College Hospital, and surgical house officer, Bellevue Hospital.
- Paul Huston Stevenson, A.B., M.D., Assistant in anatomy. Hiram College, Ohio, A.B., 1912. Washington University, M.D., 1916. Luchowfu Hospital, Anhwei, China, 1917-1920.

- Hsien Wu, B.S., Assistant in physiological chemistry. Massachusetts Institute of Technology, B.S., 1916. Harvard Medical School, majoring physiological chemistry, 1917–1919. Assistant in chemistry, Massachusetts Institute of Technology, 1916–1917.
- Johannes H. Bauer, M.D., Assistant in bacteriology. Royal University of Upsala, M.D., 1915. Imperial University of Moscow, M.D., 1916. Assistant to professor of surgery, University of Moscow, 1916–1917. Surgeon on Trans-Baikal Railway, 1918. In charge of anti-typhus train, American Red Cross, Vladivostok, 1919–1920.
- K. H. Collins, B.S., Part-time assistant in physiology and pharmacology. University of Idaho, B.S., 1917. Rush Medical School, 1917–1919. Assisted in zoology and comparative anatomy, University of Idaho, 1919–1920.
- J. L. McCartney, B.S., Part-time assistant in physiology and pharmacology. University of Chicago, B.S., 1920.
- Ta-chih Pa, M.D., Clinical assistant in ophthalmology.
- H. S. Wang, B.Sc., Clinical assistant in roentgenology.

THE DEPARTMENT OF RELIGIOUS AND SOCIAL WORK

- Philip Allen Swartz, A.B., Director of religious and social work. Lafayette College, A.B., 1910. Union Theological Seminary. Ordained by Presbytery of Newark, N.J., 1917. Formerly pastor of church of Forest Hills, Long Island, N.Y., (union, undenominational).
- Stephen Wang, A.B., Assistant to director of religious and social work.

THE TRAINING SCHOOL FOR NURSES

Anna Dryden Wolf, A.M., R.N., Superintendent of nurses.

Mary Louise Beaty, B.S., R.N., Instructor.

Ruth Ingram, A.B., R.N., Assistant supervisor.

Graduate Nurses

Lucy Abbott, R.N. Kathleen Caulfield, R.N. Helen R. Goforth Florence Kelley Goodman, R.N. Hsiu-lan Pai Mary L. Grayson, R.N. Elsie Matilda Hackett, R.N. Frances S. Hall, R.N. Virginia Harrell, R.N. Helen M. Holland, R.N. Dorothy Jacobus, A.B., R.N. Mary Van S. McCoy, R.N. Mary Priscilla Moo

Mabel Mooney, R.N. Winifred Mooney, R.N. Mrs. S. B. Packer, R.N. Mary S. Purcell, R.N. Ethel E. Robinson, R.N. Mrs. Grace Rogers, R.N. Bertha L. Sutton, R.N. Lula Sweet, R.N. Elizabeth Sze Mabel E. Tom, R.N. Faye I. Whiteside, R.N.

THE HOSPITAL AND PHYSICAL PLANT

Donald E. Baxter, M.D., Superintendent. Hiram College. University of Louisville, M.D. Wide engineering and administrative experience. Director of New York Committee on After Care of Infantile Paralysis Cases. Worked on organization of hospitals under Red Cross in France.

James S. Hogg, Comptroller. Practiced civil engineering in Scotland until 1912. Member of the Construction Staff of the Provincial Secretary's Department, Ontario. Assistant Director of the Department of Soldiers' Civil Re-establishment with the Federal Government of Canada, 1917. Employed by W. B. Richards and Co., New York, 1919.

- Donald W. Salisbury, B.Sc., Assistant superintendent. Middlebury College, B.Sc. Formerly engineer and chemist of the General Carbonic Company, New York.
- George G. Wilson, Superintendent of buildings and grounds.
 On staff of college under former management.
- Edward Watson, Operating engineer.
- John Cameron, Pharmacist. Qualified British pharmacist, with distinction in chemistry.
- E. Grace McCullough, Dietitian. Studied at Washington School of Cookery, and Southern Homeopathic Medical College. Formerly dietitian, Massachusetts General Hospital, and Peter Bent Brigham Hospital, Boston. In 1913 investigated and reported on von Noorden Clinic, Vienna.
- Ernest Hall, Assistant comptroller. Assistant accountant, Shanghai-Nanking Railway, 1905-1910. Chief accountant, Canton-Kowloon Railroad, 1910-1914. Managing Director "Chinese Products Ltd.," 1919-1920.
- E. Pauline Richardson, A.B., Assistant dietitian. University of Kansas, A.B., 1914. Diet technician, Peter Bent Brigham Hospital, Boston, 1914–1917. Dietitian, U.S. Army Base Hospital No. 23, 1917–1919. Dietitian, U.S. Naval Hospital, Bremerton, Wash., June, 1919–June, 1920.
- H. C. Mao, Accountant.
- Yin-dah Hsü, Ph.C., Assistant pharmacist. Yale College in China, 1911-1916. University of Maryland, Ph.C., 1918.

OTHER OFFICERS

Ida Pruitt, Hospital social service worker. Cox College.
Teachers College, Columbia University. Teacher,
Orphans' Home, Dobbs Ferry, N.Y. Principal,
Girls' Grammar School, Chefoo, Shantung, China.
Social service case worker, Philadelphia Society for
Organizing Charity.

Mary A. Cook, A.B., Librarian. University of Rochester, 1905-1907. Columbia University Library School, 1907-1908. University of Wisconsin, A.B., 1913. Reference librarian, University of Wisconsin, 1913-1914. Columbia University: library order department, 1915-1916; librarian, School of Journalism, 1916-1919

RESIDENT STAFF (1920-1921)

George W. Van Gorder, Resident in surgery, and associate.

Chi-cheng Liu, Assistant resident in medicine.

Ts-tswang Dzen, Assistant resident in ophthalmology.

Ying-keng Ch'ang
Lee-chang Chu
Chung-hsin Han
Shih-en Kao
Yu-tien Lee
Wen-ping Ling
Kuo-chih Liu
Ta-chün Yang

Publications. The following is a partial list of articles published or submitted for publication by staff members who were in Peking in June, 1920:

HARVEY J. HOWARD, M.D.

A test for the judgment of distance. American Journal of Ophthalmology, Sept., 1919.

Judgment of distance with semaphores and a screen at 100 meters. Archives of Ophthalmology, Sept., 1919.

A six meter stereoscope. American Journal of Ophthalmology,

Dec., 1919.
A stereomicrometer, or an instrument of precision for measur-

A stereomicrometer, or an instrument of precision for measuring stereopsis. Transactions of the American Ophthalmological Society, 1919.

A new apparatus for testing accommodation. Archives of Ophthalmology, March, 1920.

Health education in schools of higher learning in China (in collaboration with W. G. Lennox and E. T. Hsieh). *China Medical Journal*, March, 1920.

The selection of men for aviation service. Journal of the National Medical Association of China, March, 1920.

Tenotomy of the inferior oblique. Archives of Ophthalmology, March, 1920.

A uniform system of eye tests. China Medical Journal, May, 1920.

The origin of the vitreous. China Medical Journal, anatomical supplement, July, 1920.

John H. Korns, M.D.

Examination of household servants for communicable disease.

Preliminary report, China Medical Journal, Nov., 1920.

Treatment of chronic morphisism. China Medical Journal

Treatment of chronic morphinism. China Medical Journal, Nov., 1919.

W. G. LENNOX, M.D.

A case of cretinism (in collaboration with B. E. Read). China Medical Journal, March, 1920.

Syphilis of the central nervous system among Chinese; incidence, report of cases, and treatment. *China Medical Journal*, in press.

The health of missionaries in China. Chinese Recorder, Sept., 1920.

T. M. Li, M.D.

Practical considerations in refraction. Journal of the National Medical Association of China, June, 1920.

J. HENG LIU, M.D.

Incidence of abdominal diseases among Chinese. Journal of the National Medical Association of China, March, 1920. Iso-agglutination tests on 1000 Chinese bloods. Journal of the National Medical Association of China, in press.

J. Hua Liu, M.D.

Comparative anatomy of the mastoid region. China Medical Journal, in press.



Fig. 94.—One of the rooms of the library in the chemistry building



Fig. 95.—Lobby of nurses' home, showing Chinese interior and decorative screen

WAY-SUNG NEW, M.D.

The use of boiled bone as transplants in tuberculosis of spine and as internal splints in reduction of fractures. Journal of the National Medical Association of China, March, 1920.

PI HUA TEH, M.D.

Ancient Chinese treatment of eye diseases. Journal of the National Medical Association of China, in press.

RICHARD H. P. SIA, M.D.

Routine Wasserman tests on 502 in-patients. China Medical Journal, Jan., 1921.

H. JOCELYN SMYLY, M.D.

The treatment of syphilis. China Medical Journal, Nov. 1919.

A study of 35 cases of typhoid and paratyphoid. China Medical Journal, March, 1920.

EDGAR T. H. TSEN, M.D.

Notes on the etiology of the last cholera epidemic. National Medical Journal of China, March, 1920.

Bacillus pyocyaneus infection: report of a case. China Medical Journal, July, 1920.

B. Aid to Other Medical Schools

The original plans of the Rockefeller Foundation and its China Medical Board had contemplated the erection of a medical school at Shanghai. When it was decided not to proceed with this project the following announcement was issued by the Foundation:

The Rockefeller Foundation announces that owing to changes in the world situation growing out of the war, it has felt impelled to set aside the purpose previously announced of establishing a medical school in Shanghai.

The purpose of the Foundation in China is to aid through its China Medical Board in developing, in co-operation with existing agencies, a comprehensive system of scientific medicine. With this in mind, two medical schools of high grade were originally planned: the first in Peking,



Fig. 96.—Map of China, showing medical institutions aided by the China Medical Board (in addition to the Peking Union Medical College, supported in full)

where a missionary medical school, the Union Medical College, was to be taken over; and the second in Shanghai. In addition, a program has been followed during the past five years which included appropriations toward increasing the staffs, buildings and equipment of a number of mission hospitals, toward strengthening the pre-medical work of a few existing colleges and universities, and toward advanced training of Chinese and missionary physicians.

The Peking Union Medical College was opened in the autumn of 1919. A two hundred and fifty bed hospital and ample buildings for laboratory and teaching purposes will be completed during the coming winter, and a staff comprising both Chinese and Western teachers trained in modern scientific medicine is already assembled at Peking. The formal dedication of the buildings will take place in the autumn of 1921. Grants have been made also to medical schools at Changsha and Tsinan. The establishment of the school in Shanghai was postponed until the Peking Union Medical College buildings should be near completion and the faculty assembled. When the Shanghai Medical School project was again considered, the world situation had greatly changed. The war has created new needs and new opportunities for aid in Europe. A consideration of world needs in medicine and public health makes it seem inadvisable for the Rockefeller Foundation to establish and maintain a second modern medical school in China, with the responsibilities for expense and trained medical personnel which this involves.

The Foundation expects to continue to co-operate through the China Medical Board with hospitals and premedical courses in important centers in China, and will continue the development of the Peking School in accordance with the high standard it has set for itself. It is hoped that this school will be a useful contribution to the progress of modern medicine throughout the entire country.

The China Medical Board has aided in the educational work of a few medical schools which are administered by other organizations. By the end of 1920 the total amounts appropriated to these schools were:

Harvard Medical School of China1	\$15,000
St. John's University of Pennsyl-	
vania Medical School	6,000
Shantung Christian University	191,763
Hunan-Yale Medical School	140,902
Red Cross Hospital, Shanghai ²	65,101
— Тотац	\$418,766

Closed in 1916.
 Closed in 1918.

II. PRE-MEDICAL EDUCATION

A. Peking Pre-Medical School

With the undertaking of medical education in Peking the problem of adequate preparation of students became serious. A good grounding in the English language and in the sciences of physics, chemistry, and biology is essential for modern medical work. As yet the schools and colleges in the vicinity of Peking are not prepared to provide this fundamental training. They have not the necessary laboratories and equipment, nor the specialized teaching faculties. The Trustees therefore decided to open a premedical school in connection with the Peking Union Medical College. It is hoped that premedical instruction will soon be offered by other agencies, and that the Board will be able to give up this branch of its work.

The pre-medical school opened in the autumn of 1917. Originally a two-year course was planned, but it has recently seemed necessary to add a third year to the course. The subjects taught are biology, chemistry, physics (including a certain amount of higher mathematics), English, and Chinese. The last two years of the work are of strictly college grade. Thirty-four students were enrolled during 1919–1920 and

fifty-nine during 1920-1921. On graduation from the pre-medical department a certificate is issued which entitles the holder to enter the medical school without further examination.

PERSONNEL. The present faculty of the premedical school is composed of eleven American and five Chinese teachers, as follows:

THE PRE-MEDICAL SCHOOL

- William Warren Stifler, A.B., A.M., Ph.D., Assistant professor of physics, in charge of department, and dean. Shurtleff College, A.B., 1902. University of Illinois, A.M., 1908; Ph.D., 1911. Instructor in physics, Columbia University, 1911–1916.
- Stanley D. Wilson, A.B., A.M., Ph.D., Assistant professor of chemistry, in charge of department. Wesleyan University, A.B., 1909; A.M., 1910. University of Chicago, Ph.D., 1916. Instructor in organic chemistry, Rice Institute, Houston, Texas, 1916-1917.
- Charles Packard, B.S., M.S., Ph.D., Assistant professor of biology, in charge of department. Syracuse University, B.S., 1907; M.S., 1908. Columbia University, Ph.D., 1914. Instructor in biology, Columbia University, 1914–1918.
- Adolf Eduard Zucker, A.B., A.M., Ph.D., Assistant professor of modern European languages, in charge of department. University of Illinois, A.B., 1912; A.M., 1913. University of Pennsylvania, Ph.D., 1917. Formerly teacher of French and German, Tsing Hua College, Peking.
- K. M. Ma, Hsui-ts'ai, Instructor in Chinese, in charge of department. Formerly taught in preparatory department of Government University at Peking.

- Bird R. Stephenson, A.B., M.S., Instructor in physics. Albion College, Michigan, A.B., 1914. University of Illinois, M.S., 1917. Assistant in physics, University of Illinois, 1917-1918.
- Aura Severinghaus, B.S., A.M., Instructor in biology. University of Wisconsin, 1912–1915, major zoology. Columbia University, B.S., A.M. Has completed work for Ph.D., at Columbia University. Assistant in zoology, Columbia University, 1916–1917, 1919–1920.
- Helen R. Downes, A.B., M.S., Instructor in chemistry. Columbia University, A.B., 1914; M.S., 1918. Teacher of chemistry, Vassar College, 1914-1916; Barnard College, 1916-1918.
- Emily Tilly, Instructor in modern European languages. Educated in Great Britain, Germany, and the United States. Course in phonetics, Columbia University, 1919–1920. Teacher of German phonetics at Tilly Institute, Germany. Teacher of German and French, Holy Angels' Academy and D'Youville College, Buffalo, 1916–1919.
- C. T. Feng, Assistant in chemistry. Assistant in chemistry at the Union Medical College, 1915-1916. Postgraduate course in chemistry at Weihsien, 1916-1917.
- Paul C. T. Kwei, A.B., M.S., Assistant in physics. Yale University, A.B., 1917. Cornell University, M.S., 1920. Instructor in English, Tsing Hua Middle School, 1913-1914.
- Edna M. Wolf, Ph.B., M.S., Assistant in biology. Hamline University, Ph.B., 1911. University of Minnesota, M.S., 1919; courses in general physiology and physiological chemistry, 1919–1920. University of Minnesota: assistant in general chemistry, 1918-

1919; research assistant, summer of 1919; assistant in zoology, 1919–1920.

- Ewing C. Scott, A.B., Assistant in chemistry. Leland Stanford Jr. University, A.B., 1916 (specialized in chemistry). University of California, postgraduate work towards Ph.D. in chemistry. Teacher of elementary chemistry, University of California, 1916–1917. Research work and instructor, U.S. Army, chemical warfare service, 1917–1919. Chemist, Phelps Dodge Corporation, Morenci, Arizona, 1920.
- A. S. Hogenauer, A.B., Assistant in modern European languages. College of City of New York, A.B., 1920.
- C. M. Yü, Assistant in Chinese.
- I. F. Yü, Assistant in chemistry.

B. Aid to Pre-Medical Education in Other Institutions

In an effort to strengthen pre-medical education the China Medical Board has also helped several institutions which already possessed departments of science and were giving what scientific preparation they could to the students who desired to enter Peking Union Medical College and other medical institutions of good standing. Five such institutions are the Canton Christian College, the pre-medical department of Hunan-Yale Medical School, the Fukien Christian University, Ginling College for Women, and St. John's University.

III. OTHER ACTIVITIES

A. Aid to Hospitals

From the beginning of its work, the China Medical Board has been interested in the development of mission hospitals, and on invitation has shared in certain instances in increasing the staffs, enlarging the buildings, and supplying new equipment for a few strong, strategically situated hospitals. To date, grants have been made to thirty-three hospitals. For hospital appropriations, together with loss by exchange, the payments for the year 1920 were approximately \$64,250.

The first hospital under strictly Chinese auspices to receive a grant from the China Medical Board is the Peking Central Hospital, which has been given \$5,000 a year for three years, plus \$3,000 for equipment. This is a new, 120-bed hospital, built and equipped entirely through funds subscribed by Chinese, and is under Chinese management. The income is for the most part derived from contributions received from railway, government, and private sources. The institution appeared to offer a favorable opportunity to test on a small scale a purpose that had long been entertained,—that of aiding, when

possible, medical work wholly under Chinese auspices.

B. Fellowships and Scholarships

Pending the opening of the Peking Union Medical College, a number of fellowships for study in the United States have been granted to both Chinese and missionary physicians and nurses. It is hoped that when the Peking school is fully established the fellowships may be reduced in number, and that only specially qualified men will be sent to the United States for graduate work in advanced subjects which the Peking college may not be so well prepared to offer as some of the schools in the United States.

During the past year, twenty-seven medical missionaries and nurses on furlough, eleven Chinese graduate students, eight Chinese undergraduate medical students, and four Chinese nurses studied in America and Great Britain with the aid of fellowships which aggregated \$29,095.25. Fig. 97 shows by years the number of fellowships and scholarships that have been granted, the total payments made on them, and the pledges for future years.

The following is a list of persons who have studied in America and Great Britain during the past year under fellowships from the Board:

NUMBER OF HOLDERS OF FELLOWSHIPS AND SCHOLARSHIPS	FELLOWSHIPS 1915 A 15 ON WHICH 1916 A 42 PAYMENTS 1917 A 60 HAVE BEEN 1918 A 60 MADE 1919 A 57	AWARDED FOR 1920 AND FULLINE YEARS EXPENDITURES AND PLEDGES FOR FELLOWSHIPS AND SCHOLARSHIPS	1915[///// \$\frac{1}{4} \text{ 10672} \text{ 1916}[///// \$\frac{1}{4} \text{ 10672} \text{ 1916}[//////// \$\frac{1}{4} \text{ 10672} \text{ 1916}[////////////////////////////////////	AWARDED FOR 1921 AND FUTURE YEARS AND FUTURE YEARS CALINESE GRADUATE STUDENTS CHINESE UNDERGRADUATE MEDICAL STUDENTS CHINESE ON FURLOUGH CHINESE ON FURLOUGH
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Fig. 97.—Number of fellowship and scholarship holders, by years, since creation of China Medical Board, with amounts expended or pledged

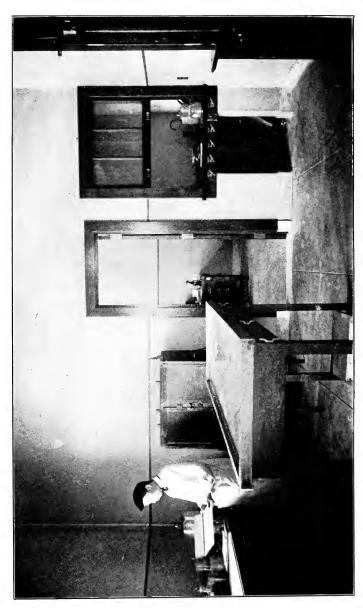


Fig. 98.—One of the private laboratories in pathology building

MISSIONARY DOCTORS AND NURSES

- Claude Heman Barlow, M.D., Shaohsing Christian Hospital. Studied parasitology at Johns Hopkins University.
- Emilie Bretthauer, M.D., Northern Baptist Hospital, Suifu. Attended general lectures and clinics at the New York Post-Graduate Medical School and Hospital.
- Harry Lee Canright, M.D., West China Union University, Chengtu. Studied anatomy, obstetrics, and allied subjects at the University of Michigan.
- Samuel Cochran, M.D., Shantung Christian University. Studied bacteriology at the College of Physicians and Surgeons.
- Frederick E. Dilley, M.D., Peking Union Medical College. Studied ear, nose, and throat at Harvard Medical School.
- F. P. Gaunt, M.D., Wuhu General Hospital. Studied genito-urinary diseases at Harvard Medical School.
- G. L. Hagman, M.D., Nantungchow Christian Hospital, Kiangsu. Studied surgery at Harvard Medical School.
- Frances J. Heath, M.D., Union Medical College for Women, Peking. Studied diagnostic and surgical methods at Harvard Medical School.
- A. R. Kilgore, M.D., Formerly Red Cross General Hospital, Shanghai. Studied surgery at Johns Hopkins University.
- Charles D. Leach, M.D., Huchow Union Hospital. Studied at the ear infirmary of the Boston Charitable Ear and Eye Infirmary.

- George Walne Leavell, M.D., Stout Memorial Hospital, Wuchow, Kwangsi. Studied clinical medicine and hospital administration at Johns Hopkins University.
- Percy Campbell Leslie, M.D., Canadian Presbyterian Hospital, Changteho. Took a general course at the New York Post-Graduate School and a course in ophthalmology at the New York Ear and Eye Infirmary.
- Walter E. Libby, M.D., Wuhu General Hospital. Studied pathology and clinical microscopy at Johns Hopkins University.
- George D. Lowry, M.D., Methodist Hospital, Peking. Took a general course at New York Post-Graduate Medical School.
- Emma E. Martin, M.D., Isabella Fisher Hospital, Tientsin. Studied physical diagnosis at Harvard and at the Mayo Clinic, Rochester, Minn.
- Richard Howard Mole, M.D., Mukden Medical College. General study at Mayo Clinic, Rochester, Minn., and work in cystoscopy and pathology at the New York Post-Graduate Medical School.
- Myra L. Sawyer, Williams Porter Hospitals. Hospital observation in Detroit and Boston.
- T. Dwight Sloan, M.D., University Hospital, Nanking. Studied neurology at Johns Hopkins and pediatrics at Harvard Medical School.
- Ada B. Speers, M.D., Women's Hospital, Canadian Methodist Mission at Chengtu. Studied at the Toronto General Hospital.
- Sada Collins Tomlinson, Men's Hospital of the American Episcopal Mission, Anking. Studied nursing and administration at Teachers College.

- C. E. Tompkins, M.D., Suifu Baptist Mission Hospital. Studied diseases of the digestive tract at Cornell University Medical School; visited Mayo Clinic; studied water analysis and rabies at the University of Michigan.
- George T. Tootell, M.D., Northern Presbyterian Hospital, Changteh. Studied at the Chicago Lying-in Hospital and at the Harvard School of Tropical Medicine.
- Charles Garnet Trimble, M.D., Alden Speare Memorial Hospital, Yenping. Studied diagnosis in the surgical department of the Presbyterian Hospital, New York.
- Augustine W. Tucker, M.D., St. Luke's Hospital of the American Episcopal Mission, Shanghai. General study and a course in fractures and operative surgery at New York Post-Graduate Medical School.
- Fred J. Wampler, M.D., Church of the Brethren Hospital, Pingtingchow. Studied parasitology at Harvard Medical School.
- Marguerite D. Warfield, Hunan-Yale Hospital, Changsha. Studied nursing and hospital administration at Teachers College.
- James M. Wright, M.D., Canton Hospital. Studied at Massachusetts General Hospital; general course and work in obstetrics and gynecology at the New York Post-Graduate Medical School and Hospital; studied at the New York Lying-in Hospital and at the Mayo Clinic, Rochester, Minn.

CHINESE GRADUATE STUDENTS

- Edward Young Kau, M.D., Harvard Medical School of China. Studied at the Hospital for the Ruptured and Crippled, New York.
- Kwang-hsun Li, M.D., Polyclinic Hospital, Philadelphia. Studied pediatrics at Harvard.

- Chong-eang Lim, M.D., Peking Central Hospital. Studied public health and bacteriology at Johns Hopkins University and studied at the School of Tropical Medicine, Liverpool, England.
- Chi-cheng Liu, M.D., Peking Union Medical College. Studied internal medicine at Washington University, St. Louis, and University of Chicago. Appointed assistant resident, department of medicine, Peking Union Medical College, July 1, 1920.
- Wen-chao Ma, M.D., Union Medical College, Peking. Studied anatomy and biology at the Marine Biological Laboratories, Woods Hole, Mass., and anatomy at the University of Chicago.
- Mary Tai, M.D., Women's and Children's Hospital, Nanchang. Course in dissection at Bellevue Hospital Medical School; resident in obstetrical department of Worcester Memorial Hospital; general course at the New York Post-Graduate Medical School.
- Yao Wong, M.D., Hunan-Yale Medical School, Changsha. Studied pathology at Harvard Medical School and at Peter Bent Brigham Hospital, Boston.
- Sze-dau Tsiang, M.D., Church General Hospital, Wuchang. Studied surgical diagnosis and pathology at Harvard Medical School.
- Lan-sung Woo, M.D., St. Luke's Hospital, Shanghai. Studied at Harvard Medical School and out-patient department, Children's Hospital, Boston.
- Hsien Wu, B.S., Harvard Medical School. Studied biological chemistry at Harvard Medical School.
- Zung-dau Zau, M.D., Red Cross General Hospital, Shanghai. Externe, Boston City Hospital.

CHINESE UNDERGRADUATE STUDENTS

- Sheo-nan Cheer, M.D., June, 1920, Johns Hopkins Medical School. Entered Massachusetts General Hospital as interne in September, 1920.
- Tze King, M.D., June, 1920, Harvard Medical School. Commenced interneship Boston Consumptives' Hospital, in July, 1920.
- Wen-ping Ling, M.D., June, 1920, Harvard Medical School.
 Appointed interne, Peking Union Medical College,
 July 1, 1920.
- Ven-tsao Loh, M.D., June, 1920, Harvard Medical School. Commenced interneship Barnes Hospital, St. Louis, Mo., in July, 1920.
- Long-teh Tso (Ernest Tso), M.D., Harvard Medical School. Interne, Boston City Hospital. Returned to China in spring of 1920.
- Shu-tai Woo, M.D., Harvard Medical School. Interne, Massachusetts General Hospital.
- Chen-hsiang Hu. In senior year at Harvard Medical School, Boston, Massachusetts.
- Cheuk-shang Mei. In senior year at College of Physicians and Surgeons, New York.

CHINESE NURSES

- Mabel Mooney, Red Cross General Hospital, Shanghai. Massachusetts General Hospital, Boston.
- Winifred Mooney, Massachusetts General Hospital. Wesson Maternity Hospital.
- Elizabeth Sze, Mary Black Hospital, Soochow. Johns Hopkins Hospital.
- Zing-ling Tai, Peter Bent Brigham Hospital, Boston.

C. Miscellaneous

Medical Conference at Peking. During the week ending February 28, 1920, the China Medical Missionary Association and the National Medical Association of China held their biennial conferences in the new buildings of the Peking Union Medical College. A very full program had been arranged and a successful effort was made to emphasize the professional papers and discussions rather than the business sessions. Most of the time, apart from the sectional meetings, was devoted to discussion of the needs of mission hospitals, upon which Dr. H. Balme, of Tsinanfu, had prepared a very thorough report.

Among the foreign visitors not connected with either of the two associations were Dr. Ales Hrdlicka, of the Smithsonian Institution, Washington, D.C.; Drs. M. Inouye and S. Ono, of the Imperial University of Tokyo; Dr. H. S. Earle, Dean of the Medical School of Hongkong University; and Dr. Poupelain of the French navy, who had been doing research work in Szechuen province and teaching in the provincial medical school at Chengtu.

SURVEY OF MIDDLE SCHOOLS AND COLLEGES FOR PROSPECTIVE MEDICAL STUDENTS. The National Medical Association of China began, in December, 1919, in co-operation with the China

Medical Board and at the request of Mr. Roger S. Greene, Resident Director of the Board, a survey of the middle schools and colleges of China, both government and private; while the China Medical Missionary Association, at the close of 1920, was preparing to undertake a similar survey of missionary medical schools. In the former investigation 817 questionnaires were mailed. Largely owing to the unsettled conditions in the country, only 24 per cent of the questionnaires had been returned by December 31, 1920. However, the number of students covered by the returns was 36,095. Of these, 1,153 (3.11 per cent) expressed an intention to study medicine. Dr. C. V. Yui, who compiled the report, states: "The survey seems to indicate that if China is to possess within a reasonable time a medical profession composed of scientifically qualified Chinese physicians in strength sufficient to cope with the medical needs of the country, attention must be directed not wholly to the number and condition of our medical schools; it is also necessary to take measures to induce a much larger number of Chinese students to study medicine than is shown by the present investigation."

MEDICAL TERMINOLOGY. China has not as yet a standardized medical terminology. Committees of the China Medical Missionary Association and of the National Medical Association

have been working for some years on this problem. The Publication Committee of the China Medical Missionary Association has translated, and published in Chinese, standard text books for use in medical schools. The China Medical Board, in accordance with a former grant, contributed Mex. \$10,000 for the translation of medical terminology during 1920.

A conference on this subject was held at Peking Union Medical College in July, 1920. At this session the bacteriological terms were provisionally finished. Considerable progress has been made with chemistry and physics, but the former has presented special difficulties, owing to the necessity of finding altogether new terms for organic chemistry.

D. The Board

The Board has held during the year three stated meetings, in addition to two special Board meetings and numerous meetings of the Executive Committee. Early in the spring the Resident Director in China, Mr. Roger S. Greene, returned to the United States for a few weeks, to attend the meetings of the Board held in April and May.

DIVISION OF MEDICAL EDUCATION Report of the Director

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To the President of the Rockefeller Foundation: Sir:

I have the honor to submit herewith my report as Director of the Division of Medical Education for the period January 1, 1920, to December 31, 1920.

Respectfully yours,
RICHARD M. PEARCE,
Director.

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DIVISION OF MEDICAL EDUCATION

In December, 1919, the Foundation created a Division of Medical Education to assume direction of its rapidly expanding program for aiding in the development of medical education throughout the world. This new division is charged with studying medical education and with assisting in promoting it as important opportunities offer. The United States is excluded from its program by reason of the fact that the work of the General Education Board embraces the promotion of education, including medical education, in this country. The Division, undertakes surveys and studies of conditions in medical education in other countries throughout the world; makes recommendations to the Foundation that it participate in the development of medical education in these countries; undertakes the execution of its ideas; gives counsel in connection with the special work which the China Medical Board has been carrying on since December, 1914; arranges courses of study in America for the large and increasing numbers of medical fellows who are coming from many lands; and assumes other duties of similar nature assigned it from time to time.

During the year 1920 the chief activities of the Division were: (I) the carrying out of a program

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for advancing medical education in Canada; (II) participation in the further development of a medical center in London; (III) the extension of aid to the medical department of the University of Brussels; and (IV) study of the medical situation in China.

I. Canadian Medical Program

In a statement accompanying his gift of December, 1919, the Founder referred to the residents of the United States and Canada as neighbors, bound closely together by ties of race, language, and international friendship. He emphasized the sacrifice of youth and resources which the Canadian people had made unstintingly in the late war and expressed the hope that a part of his gift might be used for developing medical education in Canada. Accordingly, the sum of \$5,000,000 was set aside for use in that country. Conferences were arranged with Canadian medical school authorities, government officials, and other citizens, in an effort to obtain their ideas as to the best method to be pursued in distributing this appropriation; and as a result of studies made by the President of the Foundation and the Director of the Division of Medical Education, a dominion-wide policy was proposed.

It was felt that the needs of Canada in the field of medical education could be supplied by seven

strong schools: (1) Dalhousie, at Halifax; (2) McGill, at Montreal; (3) Toronto, at Toronto; (4) Manitoba, at Winnipeg; (5) British Columbia, at Vancouver; (6) a school for the French Canadians at Montreal; and (7) a school for northwestern Canada at Edmonton, Alberta. The first five schools give a geographical distribution across the continent: the sixth cares for the French Canadian population; and the seventh for the rapidly developing Northwest. With the exception of the school at Vancouver-plans for the development of which have not yet been fully matured—the Foundation worked out with each of the above strategically situated schools a general program of development to be carried out over a number of years, which includes provision for progress in buildings and equipment, in hospital and other clinical facilities, and in methods, as well as for the strengthening of personnel. Appropriations toward projected developments, involving large additional sums from other sources, were then made as follows:

McGill University, Montreal	\$1,000,000
University of Toronto	1,000,000
University of Manitoba	500,000
Dalhousie University	500,000
Dalhousie University	2,000,000
Total	\$5,000,000

From the income of the reserve, gifts of \$25,000 each for current expenses of the year were made

to the *Université de Montréal* and to the University of Alberta, both in process of reorganization.

II. Development of London Medical Center

During 1919 and 1920 a brief survey of medical education and public health administration in Western Europe was made by the Director of the Division of Medical Education and the General Director of the International Health Board. The study in London disclosed an interesting and important situation. Interest in the full-time, or unit, plan had been aroused, and in four of the London schools at the time of the visit the plan was on trial but under conditions which did not guarantee success. It was important that in one school at least the plan should be tried out under the best possible circumstances as to staff, number of beds, laboratory equipment, and financial support. After a careful study it was decided that the University College Hospital Medical School more closely approached the conditions necessary to insure the success of the newer methods of clinical teaching than did any other school in London. To accomplish this result and to make this institution an outstanding example for English medical schools, it was necessary that there should be provided a modern institute of anatomy; additional means for the departments of anatomy, physiology, and



Fig. 99.—A children's ward, University College Hospital

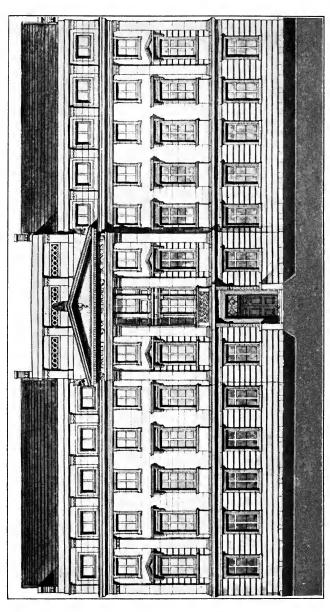


Fig. 100.-New anatomy building, University College, University of London

pharmacology; one hundred endowed beds and the necessary clinical laboratories, for teaching purposes, in the hospitals; that the obstetric unit should be endowed; that a laboratory for pathological chemistry should be established; and that there should be augmented support for full-time teaching and research.

A commission from University College and from University College Hospital Medical School visited the United States and discussed its plans at length with officers of the Foundation. The result was the drawing up of agreements looking toward Foundation co-operation. The contracts provide that toward the proposed program the Foundation shall donate for University College, 190,000 pounds for buildings and equipment and 180,000 pounds for endowment; and for University College Hospital, 400,000 pounds for buildings and equipment and 435,000 pounds for endowment, making a total from the Foundation of approximately \$4,000,000 toward the entire plan of development.

III. Aid to University of Brussels

The study made in 1919-1920 of medical education in Western Europe included a survey of conditions in Belgium. The importance of aiding development in the medical school of the University of Brussels was recognized, but no

action was recommended pending the completion by the authorities in Brussels of their plans for reorganization. When these plans had taken definite shape a delegation came to the United States to present them and to discuss them at length. The proposals for rebuilding and reorganizing the medical school included the construction by the city of Brussels of a new city hospital, and the erection by the University of a school for nurses and a students' club, with endowment for maintenance. The Foundation, as its share, was invited to supply funds for the construction and equipment of laboratories and teaching buildings, with endowment for maintenance, as well as to provide an endowment to meet a proposed increase in faculty salaries. The Foundation thereupon pledged itself to contribute toward this enterprise, which will involve altogether approximately 100,000,000 francs, the sum of 40,000,000 francs.

IV. Medical Education in China

Medical education in China has been since 1915 the special concern of the China Medical Board. A report of the work of that Board is included in this volume.

During 1920 the Director of the Division of Medical Education spent several months in Peking, studying the problems of medical edu-

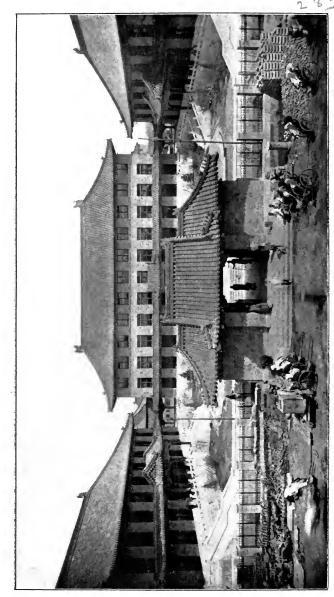


Fig. 101.—Physiology, chemistry, and anatomy buildings (nearing completion). Peking Union Medical College



Fig. 102.—One of the laboratories of Peking Union Medical College

cation in China and their bearing on conditions throughout the world. He acted as counsel to the Director of the Peking Union Medical College and for a short time was Acting Director of the School.

V. Miscellaneous

In addition to these larger activities the Division has given service in the important work of placing men who hold fellowships from the International Health Board and the China Medical Board. These men come from various countries and are carefully selected not only on the basis of their preliminary training but also with a view to their fitness for assuming, after special study in their particular fields, positions as teachers, investigators, or administrators in important institutional or government service in their own countries. A careful study is made of each individual's requirements, and courses of study are planned to meet his particular needs.

During the year commissions were brought to the United States as guests of the Foundation, to visit medical centers and make studies of medical education and methods. One such commission came from England and another from Belgium, and an invitation has been extended to Serbia to send a commission in 1921.

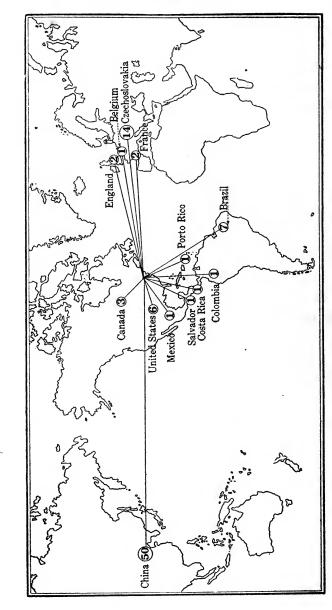


Fig. 103.—Ninety individuals representing thirteen different countries received fellowships, from the Rockefeller Foundation during 1920. The map shows the countries from which the students came

The Secretary of the Foundation visited the chief medical centers of Central Europe during the summer of 1920. At every university visited an urgent desire was expressed for British and American research journals. The war and the ensuing unfavorable rates of exchange had made it almost impossible to obtain these journals since 1915. It was decided to supply them to the universities in all European countries which were suffering from adverse exchange rates, the agreement providing that the Universities should pay for the journals in the national currency of their country at the pre-war rates of exchange, the Foundation to make up the difference due to depreciation in exchange.

Moreover, in all the universities of Central Europe equipment that had usually been replenished year by year (such as chemicals, and glassware, rubber, and similar scientific apparatus) had, during the four years of war and the two years of disorganized conditions that followed it, either been very largely consumed or altogether destroyed, while conditions of finance and exchange made it almost impossible for the universities to replace this equipment. Accordingly, the Foundation agreed to help four or five of the more important medical centers to obtain these necessary supplies, and appropriated for this purpose a total of \$100,000.

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THE ROCKEFELLER FOUNDATION

Report of the Treasurer

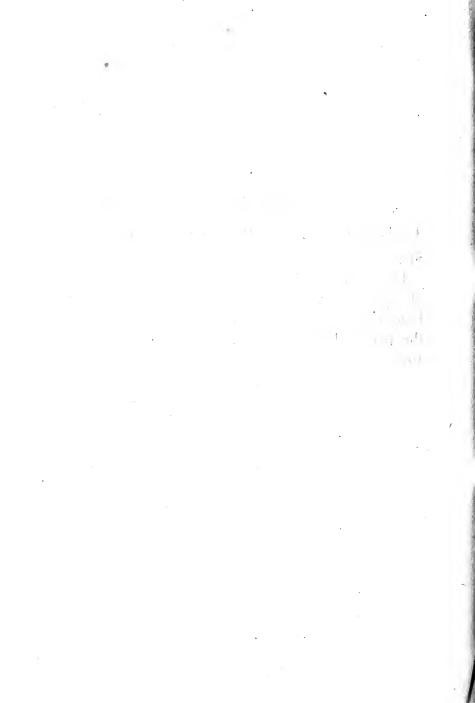
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New York, February 9, 1921

To the President of the Rockefeller Foundation: Sir:

I have the honor to submit herewith my report of the financial operations of the Rockefeller Foundation and its subsidiary organizations for the period January 1, 1920, to December 31, 1920.

Respectfully yours,
L. G. MYERS,
Treasurer.



TREASURER'S REPORT

Income from principal funds and from funds temporarily invested, exclusive of income from special funds, amounted to \$8,727,730.05. The balance of income from the previous year, after adding sundry refunds, was \$4,554,442.61. A total of \$13,282,172.66 was thus available for disbursement, of which the sum of \$7,077,856.27 was disbursed, leaving a balance of \$6,204,316.39.

Of this balance \$4,558,521.98 is applicable to appropriations made in 1920 and prior years, and \$1,645,794.41 is available for appropriation or for disbursement on account of appropriations payable in 1921.

Appropriations and pledges payable in 1921 amount to \$9,710,009.44, while those that become effective in 1922 and subsequent years amount to \$8,885,103.13.

Principal funds, including reserve fund, increased during the year from \$174,186,828.46 to \$174,432,713.06, a difference of \$245,884.60. This represents gains on securities sold and redeemed, amounting to \$398,617.60, less the sum of \$152,733.00, which was appropriated from the fund received from the estate of the late Laura S. Rockefeller.

Income disbursed for land, buildings, and equipment during the year amounted to \$2,806,790.29. The total amount disbursed to date is \$7,801,256.13, but during the year the Grand Chenier tract was deeded to the State of Louisiana, and the cost thereof, amounting to \$248,420.72, was written off the books, leaving the net amount carried as an asset in land, buildings, and equipment account at

\$7,552,835.41. A detailed statement of the account will be found in Exhibit N.

Early in the year a final gift of \$10,256.93 was received from the estate of the late Laura S. Rockefeller.

It will be noted in the accompanying balance sheet that on December 31, the Corporation was borrowing \$1,800,000 and at the same time lending \$1,450,000. This is explained by the fact that the moneys loaned were to be disbursed shortly after the close of the year, and it was deemed better to keep them in liquid form until needed rather than to repay loans and negotiate others later.

Since the close of the year the accounts of the Comptroller, the accounts of the Treasurer, and the securities owned by the Corporation have been examined by Messrs. Lybrand, Ross Bros., and Montgomery, Accountants and Auditors. They have rendered a satisfactory report of their work.

The financial condition and operations are set forth in the appended exhibits listed below:

Exhibit A
Exhibit B
Exhibit C
Exhibit D
Exhibit E
Exhibit F
Exhibit G
Exhibit H

International Health Board Appropria-	
tions	Exhibit I
China Medical Board Appropriations	Exhibit J
Summary of Appropriations and Pay-	
ments	Exhibit K
Statements of Appropriations and Pay-	
ments of Special Funds	Exhibit L
Statements of Principal Funds	Exhibit M
Land, Buildings, and Equipment Funds	Exhibit N
Statements of Transactions Relating to	
Invested Funds	Exhibit O
Schedule of Securities in General Funds.	Exhibit P
Schedule of Securities in Special Funds	Exhibit Q

EXHIBIT A

BALANCE SHEET, DECEMBER 31, 1920

ASSETS

I. INVESTMENTS General Schedule (Exhibit P). Less amount of income invested (see below) Special Funds (Exhibit Q)	\$179,279,807.74 4,963,894.68	\$174,315,913.06 116,800.00
opedai Funds (Exmolt &)		\$174,432,713.06
	,	
II. Land, Buildings, and Equipment (Exhibit N)		\$7,552,835.41
III. Income Accounts Income invested temporarily (Exhibit P) Funds in hands of agents, to be accounted for, and sundry accounts receivable		\$4,963,894.68 1,552,629.09
Moneys loaned	•	1,450,000.00 93,520.15
Less Moneys borrowed	\$1,800,000.00	\$8,060,043.92
Accounts payable	23,523.71	1,823,523.71
	•	\$6,236,520.21
GRAND TOTAL		\$188,222,068.68

EXHIBIT A

BALANCE SHEET, DECEMBER 31, 1920

FUNDS AND OBLIGATIONS

I. Funds General Fund (Exhibit M) Reserve Fund (Exhibit M)	\$171,204,624.50 3,111,288.56	@174 915 019 0e
Special Funds Gift of John D. Rockefeller. Gift of Laura S. Rockefeller. Henry Sturgis Grew Memo-	\$37,000.00 49,300.00	\$174,315,913.06
rial Fund	25,000.00	
dowment	5,500.00	116,800.00
		\$174,432,713.06
II. LAND, BUILDINGS, AND EQUIPMENT FUND Appropriations from income (Exhibit N)		\$7,552,835.41
III. INCOME ACCOUNTS Estate Laura S. Rockefeller Fund (Exhibit B)	•	\$28,753.63
Henry Sturgis Grew Memorial Fund Income (Exhibit B) Arthur Theodore Lyman En-		2,984.33
dowment Fund Income (Exhibit B)		465.86
tions payable in 1920 and prior years (Exhibit K) Income in excess of appropria-		4,558,521.98
tions payable in 1920 and prior years		1,645,794.41
		\$6,236,520.21
GRAND TOTAL		\$188,222,068.68

¹ In addition to this figure there are appropriations and pledges amounting to \$9,710,009.44 which become effective in 1921, and \$8,885,103.13 which become effective in subsequent years. These liabilities are, for the purposes of this report, considered as charges against the income for the years in which they become payable.

EXHIBIT B

STATEMENTS OF RECEIPTS AND DISBURSEMENTS OF INCOME

GENERAL FUND

$\operatorname{Receipts}$	

Balance, December 31, 1919 Refunds of payments made in prior years: The Rockefeller Foundation China Medical Board International Health Board Income from principal funds and from income invested temporarily	\$2,000.00 14.18 9,156.81	\$4,543,271.62 	\$4,554,442.61 8,727,730.05 \$13,282,172.66
· Drs	BURSEMENTS		
International Health Board (Exhibit I): Hookworm, malaria, and yellow fever work Tuberculosis work in France Medical education Miscellaneous Administration	\$922,053.98 522,459.50 44,288.59 43,100.93 91,472.20	\$ 1,623,375.20	
CHINA MEDICAL BOARD (Exhibit J): Medical Education: Peking Union Medical College: Land and buildings. Operation Shanghai Medical School: Land and buildings. Operation Unaffiliated medical schools. Pre-medical education Hospitals of missionary societies. Translation of medical and nursing textbooks. Fellowships and scholarships. Miscellaneous. Administration	\$2,772,185.85 483,059.61 22,797.43 1,010.81 58,537.50 142,805.75 62,221.47	\$3,641,595.90	

\$5,264,971.10 \$13,282,172.66

EXHIBIT B—Continued

STATEMENTS OF RECEIPTS AND DISBURSEMENTS OF INCOME

GENERAL FUND

Receipts Brought Forward	\$5 064 071 10	\$13,282,172.66
Disbursements Brought Forward	\$5,264,971.10	
MEDICAL EDUCATION (Exhibit C)	836,328.10	
MENTAL HYGIENE (Exhibit D)	93,509.95	
RESEARCH IN PHYSICS AND CHEMIS-	•	
TRY (Exhibit E)	50,466.77	
SCHOOL OF HYGIENE AND PUBLIC	00,100	
HEALTH (Exhibit F)	330,220.55	
Wan Wong (Enhibit C)		
WAR WORK (Exhibit G)	20,663.97	
Miscellaneous (Exhibit H)	276,603.11	
Administration (Exhibit H)	205,092.72	
-		7,077,856.27
Income on hand December 31, 1920.		\$6,204,316.39
Income on hand December 31, 1920,	-	
is accounted for as follows:		
	04.009.004.00	
Securities (Exhibit P)	\$4,963,894.68	
Cash on deposit	61,316.33	
Moneys loaned	1,450,000.00	
Funds in hands of agents, to be		
accounted for, and sundry ac-		
counts receivable	1,552,629.09	
	1,002,020.00	
1.00	\$8,027,840.10	
Less:		
Moneys borrowed \$1,800,000.00)	
Accounts payable		
	1,823,523.71	•
	1,020,020.71	
	\$6,204,316.39	

EXHIBIT B—Continued

STATEMENTS OF RECEIPTS AND DISBURSEMENTS OF INCOME

SPECIAL FUNDS

SPECIAL FUNDS	
LAURA S. ROCKEFELLER FUNDS	
Income collected during the year ending December 31, 1920	\$3,000.00
Amounts paid to the several societies designated by Mrs. Rockefeller	0
JOHN D. ROCKEFELLER FUND	
Income collected during the year ending December 31, 1920	\$1,850.00
Amounts paid to the several societies designated by Mr. Rockefeller	0
ESTATE LAURA S. ROCKEFELLER FU	UND
Balance of income December 31, 1919 Balance of principal set aside for appropria-	\$49,763.70
tion	$152{,}733.00 \\ 10{,}256.93$
Total	\$212,753.63
Amount paid to Fifth Avenue Baptist Church on account of appropriation of \$212,688.86	184,000.00
Balance accounted for in cash on deposit	\$28,753.63
HENRY STURGIS GREW MEMORIAL	FUND
Balance, December 31, 1919	\$1,885.70
December 31, 1920	1,098.63
Accounted for in cash on deposit	\$2,984.33
ARTHUR THEODORE LYMAN ENDOW	MENT
Balance, December 31, 1919	\$217.23
Income collected during the year ending December 31, 1920	248.63
Accounted for in cash on deposit	\$465.86

EXHIBIT C

1920 FOUNDATION APPROPRIATIONS,

Unpaid Balances of Appropriations Made in Previous Years, and Payments Thereon Made in 1920

MEDICAL EDUCATION

Austria, Hungary, Poland, Czechoslovakia, and Jugo-Slavia (R.F. 2495) To co-operate with the medical schools in the rehabilitation of their scientific equip-	PRIOR APPROPRIA- TIONS	1920 APPROPRIA- TIONS	1920 PAYMENTS
ment for teaching and research Belgium (R.F.2471) Fondation Reine Elisabeth of Brussels—Francs 1,-		\$100,000.00	\$106.60
000,000	••••••	85,000.00	80,971.66
of Brussels		4,500.00	3,757.71
tending its work in pathology		3,000.00	••••••
of pathology (R.F. 2486) São Paulo University. Toward salary of professor of pathology — \$4,000 per year for three years beginning 1920-21 (Instal-	•••••	1,000.00	
ment due 1920–21)	• • • • • • • •	4,000.00	

EXHIBIT C—Continued

	PRIOR APPROPRIA-	1920 APPROPRIA-	1920
MEDICAL EDUCATION (Cont'	TIONS	TIONS	PAYMENTS
Canada	<i>a</i>)		
(R.F. 2470) Dalhousie			
University. Toward			
its program of med-			
ical school develop-			
ment		\$500,000.00	\$500,000.00
(R.F. 2489) University		,	
of Alberta. For the			
development of work			
in clinical branches,			
1920–21	• • • • • • •	25,000.00	6,250.00
(R.F. 2488) Université de Montréal. For			
the development of			
laboratories, 1920-			
21		25,000.00	12,500.00
England		20,000.00	12,000.00
(R.F. 2466, 2482, 2490)			
University College			
and University Col-			
lege Hospital Medi-			
cal School, London.			
Expenses of visit to			
the United States of		10 700 00	0 ==4 0=
medical educators	• • • • • • •	10,500.00	3,774.65
(R.F. 2504) University of London, Toward			
building and equip-			
ment program of the			
University College			
Hospital Medical			
School—£50,000		180,000.00	174,625.00
United States		, ,	,
University of Chicago			
(R.F. 2367, 2430)			
For interest on			
pledge of \$1,000,-			
000 for the devel-			
opment of a Medi-	e1c coc 77	EO 000 00	40 469 99
cal School Fellowships	\$16,626.77	50,000.00	40,463.23
Grants for medical			
study to doctors			
from the following			
countries			
(R.F. 2467) Belgium		1,500.00	
(R.F. 2491) Canada		1,650.00	546.30

EXHIBIT C—(Continued)

	PRIOR APPROPRIA- TIONS	1920 - APPROPRIA- TIONS	1920 PAYMENTS
MEDICAL EDUCATION (Cont'	d)		
Fellowships (cont'd) (R.F. 2477) Czecho- slovakia		\$1,600.00	\$400.00
2501, 2502) Eng- land (R.F. 2492, 2500)		6,000.00	2,178.04
Brazil		2,750.00	507.24
cation (R.F. 2469) Administration—1920 TOTALS	\$16,626.77	22,000.00 \$1,023,500.00	10,247.67 \$836,328.10
Unexpended balances of appropriations allowed to lapse R.F. 2367 University of Chicago	7,174.72	9,403.34	
NET TOTALS	en 450 ns	e1 014 006 66	e026 200 10
NET TOTALS	Φ9,404.U0	\$1,014,096.66	\$836,328.10

EXHIBIT D

MENTAL HYGIENE

National Committee for Mental	PRIOR APPROPRIA- TIONS	1920 APPROPRIA- TIONS	1920 PAYMENTS
Hygiene (R.F. 2360, 2421, 2474) For the work of the Committee in aiding State Commissions on provision for the			
mentally defective (R.F. 2361, 2422) For studies in the psychopathology	\$11,684.49	\$35,000.00	\$27,36 3.17
of crime	10,886.57	10,000.00	8,255.17
mental diseases	10,862.24	40,000.00	33,557.76
mental diseases (R.F. 2400, 2424, 2455) For	1,213.22	4,000.00	4,333.85
administration expenses	2,500.00	20,000.00	20,000.00
Totals	\$37,146.52	\$109,000.00	\$93,509.95
Unexpended balances of appropriations allowed to lapse R.F. 2359 \$10,144.26 R.F. 2360 10,668.89 R.F. 2361 9,774.65 R.F. 2362 215.45 R.F. 2400 2,500.00	33,303.25		
N. (II)		———	000 500 05
NET TOTALS	\$3,843.27	\$109,000.00	\$93,509.95
Refund of amount disbursed in previous year R.F. 2310 \$2,000.00			

EXHIBIT E

RESEARCH IN PHYSICS AND CHEMISTRY

	PRIOR	1920	
	APPROPRIA-	APPROPRIA-	1920
	TIONS	TIONS	PAYMENTS
National Research Council			
(R.F. 2395, 2431) For the			
maintenance of a system of			
National Research Fellow-			
ships in physics and chem-			
istry		\$100 000 00	6 26 725 61
(R.F. 2403, 2432) For ex-	\$40,019.20	\$100,000.00	\$50,725.01
penses of the Division of		00 000 00	10 211 10
Physical Sciences	15,983.20	20,000.00	13,741.16

Totals	\$56,302.45	\$120,000.00	\$50,466.77
Unexpended balances of appro-			
priations allowed to lapse			
R.F. 2395 \$37,777.14			
R.F. 2403 14,983 . 20			
	52,760.34		
	==,.00.01		
NET TOTALS	\$3 542 11	\$120,000.00	\$50 466 77
TILL TOTALS	40,012.11		400,100.11

EXHIBIT F

SCHOOL OF HYGIENE AND PUBLIC HEALTH

I	PRIOR APPROPRIA-	1920 appropria-	1920
	TIONS	TIONS	PAYMENTS
Johns Hopkins University			
(R.F. 2170) For the estab-			
lishment of a School of			
Hygiene and Public Health\$	201,165.60		\$34,139.68
(R.F. 2356, 2417, 2462) Oper-			
ating expenses	64,751.80	\$269,904.00	234,694.43
(R.F. 2358, 2408, 2419, 2447)	•	,	,
Building alterations	18,967.91	21,250.00	11,461.03
(R.F. 2409, 2448) Furniture	12,740.00		
(R.F.2283, 2410, 2418) Equip-	,		,
ment	21,086.06	15,000.00	30,938.67
(R.F. 2449) Replacing rec-	•	,	,
ords destroyed by fire		3.000.00	1.686.85

EXHIBIT F—Continued

	PRIOR APPROPRIA- TIONS	1920 APPROPRIA- TIONS	1920 PAYMENTS
Scholarships or Stipends (R.F. 2390, 2456-60) For special work by medical men at the School of Hygiene and Public Health		\$1,100.00	
Totals	\$326,632.14	\$325,254.00 \$	330,220.55
Unexpended balances of appropriations allowed to lapse R.F. 2356 \$9,060.59			
R.F. 2390 7,920.77		1,100.00	

EXHIBIT G

WAR WORK

	PRIOR APPROPRIA- TIONS	1920 APPROPRIA- TIONS	1920 PAYMENTS
WELL-BEING OF SOLDIERS, SAIL ORS, AND PRISONERS-OF-WAR American Social Hygiene Association (R.F. 2330) For demonstration of social hygiene program in war camp community	- - 9		
MEDICAL WORK National Committee for Men- tal Hygiene (R.F. 2370) For war and reconstruction work—1919 National Research Council (R.F. 2369) For special work of its Division of Medicine and Related Sciences in connection with the war emergency and demobiliz	1 1,083.87		\$1,083.87
ation period		• • • • • • •	951.05

EXHIBIT G-Continued

	PRIOR	1920	
	APPROPRIA-	APPROPRIA-	1920
	TIOHS	TIONS	PAYMENTS
Rockefeller Institute for Medi- cal Research	•		
(R.F. 2386) For the opera- tion of its War Demonstra-			
tion Hospital 1919 (R.F. 2388) For war work	\$14,666.49		\$14,666.49
—1919(R.F. 2230) For additional	1,135.40		810.18
equipment for teaching mil-	•		
itary and naval surgeons. (R.F. 2394) For the prepa-	•	• • • • • • •	•••••
ration of serums at Prince- ton Farm—1919			3,152.38
HUMANITARIAN WORK			
American Red Cross (R.F. 2368) For the main-			
tenance and care of Belgian children in Switzerland—	ı		
1919 War Relief Commission		• • • • • • • • • • • • • • • • • • • •	• • • • • • •
(R.F. 2216) Administration	1		
—1917	3,334.57		
TOTALS	\$81,339.27		\$20,663.97
Unexpended balance of appropriations allowed to lapse R.F. 2368 American Rec			
Cross	-		
NET TOTALS	\$55,839.27		\$20,663.97

EXHIBIT H

MISCELLANEOUS

	PRIOR	1920	
	APPROPRIA-	APPROPRIA-	1920
4 ' 4 I ' D	TIONS	TIONS	PAYMENTS
American Academy in Rome			
(R.F. 215) For general pur-			
poses, \$10,000 per year for	ŗ		
ten years beginning 1914	•	@10.000.00	#10 000 00
(Instalment due 1920)		\$10,000.00	\$10,000.00
American Conference on Hospi- tal Service	•		
(R.F. 2472) For the equip-	_		
ment and maintenance of a			
Library and Service Bureau		15,000.00	3,000.00
American Committee for relief	·	10,000.00	0,000.00
of Viennese Medical Scien-			
tists			
(R.F. 2465) For purposes of	•		
food relief	· 	.10,000.00	10.000.00
American Medical Association	• • • • • • • • • • • • • • • • • • • •	20,000.00	20,000.00
(R.F. 2452) To cover one-	•		
half of the net loss in pub-			
lishing a Spanish edition of	f		
the Journal of the American	1		
Medical Association in 1919		9,792.59	9,792.59
American University Union in	1		
Europe			
(R.F. 2464) For re-organiza			
tion and maintenance ex-			
penses		15,000.00	15,000.00
Committee on Dispensary De-	•		
velopment			
(R.F. 2481) For expenses	3	10 000 00	4 500 00
during 1920	• • • • • • •	10,000.00	4,500.00
American Relief Administration			
(R.F. 2533) Toward its work	ς.		
in feeding European chil-	•	1,000,000.00	
dren		1,000,000.00	
Counsel of the Annual			
Foreign Mission Conference			
of North America			
(R.F. 228) For carrying out	:		
its program of co-operation			
and co-ordination in foreign			
missionary work of the prin			
cipal American Mission	i.		
Boards. Total pledge of	!		
\$425,000 extending over a	ı		
period of ten years begin-			
ning 1914. (Instalment due		10.000.00	40.000.00
1920)	• • • • • • •	40,000.00	40,000.00

	PRIOR APPROPRIA- TIONS	1920 APPROPRIA- TIONS	1920 PAYMENTS
Committee for Survey of Conditions and Possible Co-operation in the Care of Crippled Children in New York City (R.F. 2426) For a study of present facilities for care and re-education of such children, and of possible co-operation of the various			
agencies engaged in the work Committee for the Study of Public Health Nursing Education	\$7,018.50		\$5,486.85
(R.F. 2407,2475) For a study in the proper training of public health nurses Concilium Bibliographicum, Zurich, Switzerland	15,935.53	\$30,000.00	22,293.28
(R.F. 2463) For expenses during 1920 Medical Centers of Europe (R.F. 2478,2494) For supply-		12,500.00	7,532.36
ing the chief medical centers of Europe with important medical journals of America and England New York Association for Im- proving the Condition of the Poor	•••••	12,000.00	813.66
(R.F. 239) For the purpose of providing pensions for dependent widows with families. \$20,000 per year for ten years beginning with 1914. (Balance of			
instalment due 1919)	10,000.00	20,000.00	10,000.00
(Instalment due 1920) (R.F. 2453) To remove and	••••••••••••••••••••••••••••••••••••••	20,000.00	10,000.00
re-crect as a summer camp for New York children the buildings of the War Dem- onstration Hospital Public Health Committee of the New York Academy of Medicine (R.F. 2399) For a study of	•••••	100,000.00	100,000.00
the dispensaries of New York City	1,437.40	•••••	1,085.92

0. 1. (M !: 1. 1.2.)	PRIOR APPROPRIA- TIONS	1920 appropria- tions	1920 PAYMENTS
Study of Medical and Public Health Conditions in Eastern and Southern Europe			
(R.F. 2479) For expenses during 1920 Hospital and Dispensary		\$3,000.00	\$2,353.33
Studies (R.F. 2461) For expenses during 1920 National Information Bu-		7,000.00	6,016.11
reau (R.F. 2451) For sustaining membership for the			
year 1919–20 National Organization for Public Health Nursing (R.F. 2425) Toward its	•••••	1,000.00	1,000.00
budget for the year 1920 Rockefeller Institute for		5,000.00	5,000.00
Medical Research (R.F. 2476) For studies in animal nutrition Traveling Expenses		5,000.00	
(R.F. 2536) For expenses of representatives of the Foundation in			
connection with a con- ference in Belgium in regard to plans of the University of Brussels		5,000.00	922.00
War Demonstration Hospital (R.F. 2413) To remove	•••••	5,000.00	322.00
the buildings of the hospital from the grounds of the Rocke-			
feller Institute and re- erect them at such other place or places as			
may be advisable			
Talala Camiad Foundard	PER 201 42	@1 210 202 E0	\$964 706 10

Totals Carried Forward. \$69,391.43 \$1,310,292.59 \$264,796.10

	PRIOR APPROPRIA- TIONS	1920 Appropria- tions	1920 PAYMENTS
Totals Brought Forward.	\$69,391.43	\$1,310,292.59	\$264,796.10
Asset Accounts			
(R.F. 2439) Books for the library (R.F. 2438, 2480, 2468, 2496) Furniture and		700.00	466.66
Fixtures		7,000.00	6,919.33
Refuge. Taxes and expenses	2,366.00	3,000.00	4,421.02
	\$71,757.43	\$1,320,992.59	\$276,603.11
Unexpended balances of appropriations allowed to lapse (R.F. 2426) Committee for survey of conditions and possible co-operation in the care of crippled children in N. Y. City \$1,531.65 (R.F. 2413) War Demonstration Hospital 35,000.00 (R.F. 2479) Study of medical and public health conditions in eastern and southern Europe \$646.67 (R.F. 2439) Books for the library. 233.34	36,531.65		
(R.F. 2480) Furniture and fixtures. 80.67			
	• • • • • • • • • • • • • • • • • • • •	960.68	
NET TOTALS	\$ 35,225.78	\$1,320,031.91	\$276,603.11

	PRIOR APPROPRIA- TIONS	1920 Appropria- tions	1920 PAYMENTS
Administration (R.F. 2414, 2434, 2437, 2493, 2505 2535, 2540) Executive Offices (R.F. 2374, 2435, 2436,	\$619.33	\$187,763.84	\$185,588.11
2534) Treasurer's Office	6,337.17	17,084.18	19,504.61
Totals	\$6,956.50	\$204,848.02	\$205,092.72
$\begin{array}{c} \text{Unexpended balances of appropriations allowed to} \\ \text{lapse} \\ \text{R.F. 2374} \$2,209.80 \\ 2414 \$24.40 \end{array}$	0.004.00		
R.F. 2435 553.04 2493 2,770.66 2534 1,153.90	2,234.20	•••••	•••••
		4,477.60	
NET TOTALS	\$4,722.30	\$200,370.42	\$205,092.72

EXHIBIT I

1920 INTERNATIONAL HEALTH BOARD APPROPRIATIONS, 1

Unpaid Balances of Appropriations Made in Previous Years, and Payments Thereon Made in 1920

W	PRIOR APPROPRIA- TIONS	1920 APPROPRIA- TIONS	1920 PAYMENTS
Hookworm Work			
Southern States			
Alabama 1919—I.H. 2482-7 1920—I.H. 2655-	\$12,484.01		\$2,003.87
60, 2937		\$15,912.50	9,899.04
1919—I.H. 2490–4 1920—I.H. 2661–6	12,700.00	17 000 00	4,604.21
		15,200.00	• • • • • • • •
Arkansas 1919—I.H. 2488–9	3,500.00		
Kansas 1920—I.H. 2896, 2906–7		6,145.83	916.66
Kentucky	• • • • • • •	0,140.00	910.00
1919—I.H. 2327, 2495 1920—I.H. 2818–23,	4,535.03		842.52
2879		13,833.37	4,715.30
Louisiana 1919—I.H. 2496–8	7,200.00		1,370.18
Maryland 1919—I.H. 2499	2,400.00		2,264.25
Mississippi 1919—I.H. 2563–8,			
2583–6, 2623, 2759 1920—I.H. 2751–6,	8,582.39	• • • • • • •	8,280.60
2880–5, 2903 North Carolina		25,191.64	12,326.28
1919—I.H. 2500–8, 2288–92, 2297– 2300, 2317, 2339– 48, 2407–9, 2403,			
2420–22	5,729.42		2,373.58
2904		13,351.37	380.50

¹The Foundation provides for the cost of work carried on by the International Health Board by making to the Board one or more appropriations to cover its work during the year. From these large grants the Board then makes its own appropriations for specific objects.

	PRIOR APPROPRIA-	1920 appropria-	1920
TT	TIONS	TIONS	PAYMENTS
HOOKWORM WORK (Cont'd)			
Southern States (Cont'd)			
South Carolina			
1919—I.H. 2350–3, 2509, 2587–91,			
2593, 2625–31,	@F 000 0F		#F 0FF 10
2866–70	\$5,936.95	• • • • • • • •	\$5,077.16
2905		\$19,602.11	12,156.79
Tennessee		,	,,
1919—I.H. 2514–18,			
2596–2600	4,962.11		2,951.18
1920—I.H. 2674–8, 2944		15,575.00	9,837.41
Texas		10,010.00	3,001.11
1919—I.H. 2519–23,			
2632–37	8,536.46		3,054.51
1920—1.H. 2679–84.		15,700.00	11,037.21
Virginia 1919—I.H. 2569–72,			
2594, 2612, 2624,			
2716–7	13,444.44		10,012.42
1920—1.H. 2685–92,			0.100 #4
2768, 2897, 21052-5		24,980.79	8,492.76
West Virginia 1919—I.H. 2750	175.00		175.00
1920—I.H. 2769,	110.00		110.00
2898–21017		2,833.33	1,727.28
Infection Surveys—I.H.		F00 00	107 40
2895	• • • • • • • •	50000	107.40
Central America			
Costa Rica			
1919—I.H.2524	7,554.97	10.100.00	821.47
1920—I.H. 2693, 2718		19,196.00	9,881.99
Guatemala 1919—I.H. 2525	7,029.72		2,154.53
1920—I.H. 2694		17,200.00	9,703.23
Nicaragua		,	·
1919—I.H. 2526	9,539.66		7,584.30
1920—I.H. 2725		13,850.00	7,281.11
Panama 1919—I.H. 2527, 2601	8,086.51		5,978.15
1920—I.H. 2695		16,860.00	11,093.94
Salvador		,	
1919—I.H. 2528	4,044.27	10 450 00	Cr. 1,107.96
1920—I.H. 2696		12,450.00	5,564.14

	PRIOR APPROPRIA- TIONS	1920 APPROPRIA- TIONS	1920 PAYMENTS
Hookworm Work (Cont'd)	110115	110110	
South America			
Brazil			
1919—I.H. 2480, 2550–8, 2576–9,			
2573. 2602. 2622.			
2573, 2602, 2622, 2639, 2715\$	148,888.27		\$58,643.84
1920—1.H. 2780–90,	,		
2736, 2836, 2939-			
40, 2945, 2643-44,			
2646, 2649, 21013,		0001 070 70	115 004 00
21030		\$221,252.50	117,384.26
British Guiana	11 699 01		2 000 20
1919—I.H. 2519 1920—I.H. 2697	11,622.91	9,520.00	$3,099.80 \\ 22.32$
Colombia		9,520.00	22.32
1919—I.H. 2603	5,174.61		Cr95
1920—I.H. 2724, 2824	0,111.01	23,000.00	6,969.46
Dutch Guiana		20,000.00	0,000.10
1919—I.H. 2582	88.00		70.55
1920—I.H. 2698		744.00	376.00
Ecuador			
1920—I.H. 2727		6,000.00	
West Indies			
Grenada			
1920—I.H. 2699		7,791.00	
Jamaica		,	
1919—I.H. 2530	8,853.37		1,465.34
1920—I.H. 2700		11,970.00	5,922.97
Porto Rico			
1920—I.H. 2770, 2805		6,000.00	3,356.30
St. Lucia	0.500.00		1 000 00
1919—I.H. 2531	2,528.06	7 700 00	1,892.88
1920—I.H. 2701	• • • • • • • •	7,583.00	5,515.35
Santo Domingo 1920—I.H. 2806		1,000.00	388.09
1920—1.H. 2800 Trinidad	• • • • • • • •	1,000.00	900.09
1919—I.H. 2533	5,075.42		3,098.19
1920—I.H. 2702	5,015.42	9,540.00	
1920—1.11. 2702		3,510.00	0,002.11
The East			
Australia			
· 1919—I.H. 2642, 2535	10,366.79		4,439.88
1920—I.H. 2729–34		37,743.00	$12,\!552.23$
Borneo			
1920—I.H. 2941	• • • • • • •	5,400.00	2,944.45

	PRIOR APPROPRIA- TIONS	1920 Appropria- Tions	1920 PAYMENTS
HOOKWORM WORK (Cont'd)	110.110	HONS	TATMENTS
The East (Cont'd)			
Ceylon 1919—I.H. 2548, 2534 1920—I.H. 2771–6,	\$12,481.88		\$6,723.98
2910	• • • • • • • •	\$21,500.00	3,806.15
Egypt 1915—I.H. 237	4,641.88		
India 1920—I.H. 2942		500.00	393.48
$egin{array}{l} ext{Mauritius} \ ext{1920I.H. 2943} \dots \end{array}$		200.00	200.00
Seychelles Islands 1919—I.H. 2536	2,734.66		748.31
1920—I.H. 2703 Siam		7,000.00	395.50
1919—I.H. 2537 1920—I.H. 2779	10,084.10	5,000.00	85.33 $4,348.98$
China 1919—I.H. 2549	9,872.81		
Miscellaneous			
Conference of health officers of the Southern States I.H. 21047		4,000.00	
Investigation of sewage disposal at rural homes—I.H. 2309	5,711.99		
Motor boat for Dutch Guiana—I.H. 2231 Portable house and office	89.64		• • • • • • •
at salvador—I.H. 2449, 2614, 2839 Analysis of hookworm	278.46	150.00	
records of U. S. Army —I.H. 2608	4,456.05		
Malaria Work			
Southern States			
Alabama 1920—I.H. 2840–5		5,114.50	
Arkansas 1919—I.H. 2547	1,646.32		1,109.51
1920—I.H. 2888 Georgia		405.00	• • • • • •
1920—I.H. 2889–91 .	• • • • • • •	450.00	• • • • • • •

	PRIOR APPROPRIA- TIONS	1920 APPROPRIA- TIONS	1920 PAYMENTS
MALARIA WORK (Cont'd)			
Southern States (Cont'd)			
Louisiana 1920—I.H. 2794–7, 2837, 2846–7, 2849,			
2886–7, 21031–2 Mississippi		\$22,471.47	\$9,495.43
1919—I.H. 2538, 2545, 2620 1920—I.H. 2757, 2791–2, 2810,	\$18,087.04		6,175.63
2873-7 North Carolina		21,168.50	14,051.63
1920—I.H. 2798–2801 South Carolina		9,013.50	• • • • • • •
1920—I.H. 2760–3, 2936, 21050		11,500.00	• • • • • • • • • • • • • • • • • • • •
1920—I.H. 2892–3 Texas		2,717.00	• • • • • • • •
1920—I.H. 2850–5 Virginia		3,552.08	
1920—I.H. 2811–15. Co-operative demonstra- tion malaria control		4,350.00	•••••
—Home Office Fund I.H. 2793, 2856 Conference of Malaria		1,100.00	747.63
workers I.H. 2948		3,000.00	1,664.85
South America Ecuador			
1920—I.H. 2726	• • • • • • • •	6,000.00	3,251.52
West Indies		n.	
Porto Rico 1920—I.H. 2807		1,500.00	241.68
YELLOW FEVER WORK			
Ecuador 1919—I.H. 2539,			
2619, 2452 1920—I.H. 2728 Salvador—	74,729.94	50,000.00	3,070.19 18,729.90
1919—I.H. 2575 1920—I.H. 2803 Epidemic work	1,253.64	2,500.00	644.35 2,500.00
1920—I.H. 2902, 2909		40,000.00	13,527.48

	PRIOR APPROPRIA-	1920 appropria-	1920
	TIONS	TIONS	PAYMENTS
Yellow Fever Work (Cont'd)		
Associates of Director Salaries, traveling expenses, equip- ment and supplies 1919—I.H. 2574,	·		
2618	\$17,429.95		\$4,529.82
2908, 21016		\$95,000.00	$60,\!669.74$
TUBERCULOSIS WORK IN FRANCE			
Central Administra- tion			
1919—I.H. 2541 1920—I.H. 2706	52,643.80		7,807.19
Departmental Organ-		141,543.00	78,674.44
ization 1920—I.H. 2710 Educational Division		149,663.00	45,749.19
1919—I.H. 2543 1920—I.H. 2709	68,545.20	182,402.00	24,598.54 107,966.32
Medical Division 1919—I.H. 2542 1920—I.H. 2307	198,108.00	169,800.00	129,436.32 63,794.77
Public Health Visiting 1920—I.H. 2708		219,934.00	64,432.73
MEDICAL EDUCATION Brazil Sao Păulo Department of Hygiene I.H. 2467, 2595, 2704	4,925.84	9,500.00	6,724.59
Fellowships Public Health I.H. 2311, 2441-2, 2456, 2461-3, 2610, 2621, 2638, 2712, 2719-23, 2758, 2765, 2778, 2808-9, 2833-4, 2816, 2857-65, 2878, 2894, 2911, 2931, 2904	14,918,11	$91,\!456.56$	37,564.00
2001, 2001	,	0-,-0-100	,

Administrative Field	PRIOR APPROPRIA- TIONS	1920 appropria- tions	1920 PAYMENTS
STAFF			
Salaries—I.H. 2469, 2764, 2899, 2644 Traveling expenses— I.H. 2471, 2901,	\$2,191.29	\$334,674.67	\$ 242,008.22
2646	7,553.35	$84,\!270.72$	78,739.14
2470, 2900, 2645 Medical examination	2,108.17	$60,\!564.72$	23,988.11
of applicants I.H.		700.00	125.00
Drugs for conserving health I.H. 2648 Traveling expenses of		1,000.00	32.29
families I.H. 21049, 2472, 2646, 2647 Automobiles for di-	3,084.63	12,000.00	13,697.10
rectors in training —I.H. 2650		3,000.00	
Study leave—I.H. 2468, 2713–4 Tuition—Staff mem-		1,000.00	439.94
bers in training I.H		500.00	408.38
Miscellaneous			
Czechoslovakia Public health work —I.H. 2935 Express, freight, and		30,000.00	3,242.36
exchange—I.H. 2652		25,000.00	Cr. 974.64
Motion picture film on hookworm dis- ease—I.H. 2835,		4.000.00	
2947		4,800.00	2,817.73
Î.H. 2946		500.00	500.00
Field equipment and supplies I.H. 2651. Massachusetts public health survey I.H.		10,000.00	5,996.96
2767	1,473.91		1,466.42
—I.H. 2653		10,000.00	5,873.33

	PRIOR APPROPRIA- TIONS	1920 APPROPRIA- TIONS	1920 PAYMENTS
MISCELLANEOUS (Cont'd	!)		
Study of teaching of hygiene—I.H.21011 Paris conference on an international no- menclature of the		\$500.00	\$34.69
causes of death—I.H. 21015 Survey and exhibits Administration—		615.30	615.30
I.H. 2705, 21029 Training of British	• • • • • • • •	23,950.00	23,528.78
bacteriologist in the Noguchi yellow fe- ver technique—I.H 2817 Philippine Hospital Ship—I.H. 2481	\$12,500.00	2,000.00	
Administration			
Home Office—I.H. 2711		96,387.00	91,472.20
TOTALS	\$850,589.03	\$2,579,878.46	\$1,623,375.20
Unexpended balances of appropriations allowed to lapse	490,152.80	159,779.05	
NET TOTALS	\$360,436.23	\$2,420,099.41	\$1,623,375.20

Note—The Foundation appropriated to the International Health Board for its work during the year 1920 the sum of \$2,500,000.

EXHIBIT J

1920 CHINA MEDICAL BOARD APPROPRIATIONS, 1

Unpaid Balances of Appropriations Made in Previous Years, and Payments Thereon during the Year 1920

N

	PRIOR APPROPRIA- TIONS	1920 APPROPRIA- TIONS	1920 PAYMENTS
MISSIONARY SOCIETIES—Hos- PITALS			
American Baptist Foreign Mission Society (C.M. 276) Ningpo hos- pital—Salaries of doctor			
and nurse, \$2,250 per year for five years. (In-			
stalment for first year). (C.M. 277) Shaohsing hospital—Support of	•••••	\$2,250.00	• • • • • • •
foreign nurse, Chinese manager, and foreign doctor, \$2,475 per year			
for five years. (Instalment for first year) (C.M. 278) Shaohsing		2,475.00	
hospital — Equipment and residences for phy- sician, nurse, and Chi- nese staff	\$5,625.00		
Missions (C.M. 211, 294) Tehchow hospital—Salary of two doctors, \$3,236 per year for five years beginning 1915. (Balance due on instalments)(C.M. 297, 2229) Teh- chow hospital—Em- ployes' salaries, \$4,152 per year for five years	11,964.00	·	\$167.40
beginning 1916. (Balance due on previous instalments)	6,596.28	4,152.00	3,114.03

¹ The Foundation provides for the cost of work carried on by the China Medical Board by making to the Board one or more appropriations to cover its work for the year. From these large grants the Board then makes its own appropriations for specific objects.

	PRIOR APPROPRIA- TIONS	1920 APPROPRIA- TIONS	1920 PAYMENTS
MISSIONARY SOCIETIES—Hos- PITALS (Cont'd)		HONS	PAIMENIS
American Board of Com- missioners for Foreign Missions (Cont'd)			
(C.M.2360) Tehchow hospital—Salary of business manager, \$3,525.88 extended over a period of four years beginning 1918. (Balance due on previous instalments)			\$475.13
(Instalment due 1920)		\$950.25	237.55
Board of Foreign Missions of the Methodist Episco- pal Church (C.M. 223, 2102) Peking hospital—Salary of doc- tor, \$2,400 per year for			
five years beginning 1916. (Balance due on			
previous instalments)			
(Instalment due 1920).		2,400.00	
(C.M. 2266) Peking hospital—Support of dentist, medical practitioner and nurse, \$22,500 extending over a period of five years beginning 1918. (Balance due on previous instalments)	,		
(Instalment due 1920).		4,500.00	
(C.M. 283, 2176) Wuhu hospital—Salary and allowance of doctor, \$900 per year for five years beginning with 1916. (Balance due on previous instalments)			
(Instalment due 1920)		900.00	
(C.M. 2384) Wuhu hospital—Building of hospital and residences			
pitarana residences	40,000.00		• • • • • • •

A	PRIOR PPROPRIA- TIONS	1920 APPROPRIA- TIONS	1920 PAYMENTS
MISSIONARY SOCIETIES—Hos- PITALS (Cont'd)	110115	HONS	MIMENTS
American Board of Com- missioners for Foreign Missions (Cont'd)			
(C.M. 2385) Wuhu hospital—Salaries of additional staff and maintenance expenses, \$7,250 per year for five years beginning 1920. (Internal content of the state of		#7.950.00	
stalment due 1920) (C.M. 2474) Wuhu hos- pital — Buildings and	• • • • • • •	\$7,250.00	•••••
equipment		30,000.00	•••••
Board of Missions of the Methodist Episcopal Church, South			
(C.M. 236, 2105) Soo- chow hospital—Salary of nurse, \$600 per year for five years beginning 1916. (Balance due on previous instalments).	\$1,200.00		
(Instalment due 1920).		600.00	
(C.M. 2417) Soochow hospital—Buildings and equipment. Mex. \$50,-000		60,000.00	\$17,500.00
(C.M. 2418) Soochow hospital—Maintenance of additional foreign staff. Mex. \$8,000 per year for five years beginning 1920. (Instalment due 1920)		9,500.00	
Board of Missions of the Methodist Espiscopal Church, South—Ameri- can Baptist Foreign Mis- sion Society, Jointly (C.M. 2151) New union			
hospital, Huchow— Building and equip- ment	20,000.00		

·	PRIOR APPROPRIA- TIONS	1920 APPROPRIA- TIONS	1920 PAYMENTS
MISSIONARY SOCIETIES—Hos- PITALS (Cont'd)	110115	110110	THEMBINES
Board of Missions of the Methodist Episcopal Church, South—American Baptist Foreign Missionary Society, Jointly (Cont'd) (C.M. 2152) New union hospital, Huchow—Support of foreign phy-			
sician, \$5,025 extending over a period of five			
years. (Instalment for first year)		\$1,650.00	••••
(C.M. 2153) New union hospital, Huchow— Support of foreign nurse, \$3,000 extending over a period of five years. (Instalment for first year)	•••••	825.00	
(C.M. 2154) New union hospital, Huchow—Support of Chinese physician, \$2,250 extending over a period of five years. (Instalment for first year)		450.00	•••••
Board of Foreign Missions of the Presbyterian Church in the U. S. A.			
(C.M. 2144) Changteh hospital—Current expenses, \$2,625 per year for five years beginning 1916. (Balance due on previous instalment)	\$5,568.75		•••••
(Instalment due 1920).		2,625.00	
(C.M. 2318) Changteh hospital—Current ex- penses, \$2,250 per year for five years beginning 1918. (Instalment due			
1920)		2,250.00	•••••

	PRIOR APPROPRIATIONS	1920 APPROPRIA- TIONS	1920 PAYMENTS
MISSIONARY SOCIETIES—Hos-			
PITALS (Cont'd)			
Board of Foreign Missions of			
the Presbyterian Church			
in the U. S. A. (Cont'd)			
(C.M. 284) Chefoo hos-			
pital—Salary and al-			
lowance of doctor and			
nurse, \$2,625 per year			
for five years beginning			
1917. (Balance due on	0× 000 00		
previous instalments)	\$5,808.80	40.407.00	
(Instalment due 1920)		\$2,625.00	• • • • • • • •
(C.M. 2243) Chefoo hos-			
pital—Operating ex-			
penses, \$2,250 per year			
for five years beginning 1918. (Instalment due			
1000)		2 250, 00	\$2,250.00
(C.M. 285) Hwaiyuen		2,200.00	Ψ2,200.00
hospital—Salary and al-			
lowance of physician			
and nurse and operat-			
ing expenses, \$3,375 per			
year for five years be-			
ginning 1919. (Bal-			
ance due on previous			
instalments)	2,625.00		
(Instalment due 1920).		3,375.00	
(C.M. 286) Hwaiyuen			
hospital—Residence of	F 050 00		9 000 00
doctor and equipment	$5,\!250.00$	• • • • • • •	3,000.00
(C.M. 214, 295) Paotingfu —Salaries of doctor and			
two nurses. Shuntehfu			
—Salaries of doctor and			
two nurses, \$9,200 per			
year for five years be-			
ginning 1916. (Bal-			
ance due on previous			
instalments)	11,275.00		
(Instalment due 1920).		9,200.00	2,400.00
(C.M. 2306) Paotingfu			
hospital—Support of			
business manager, \$900			
for four years beginning			
1918. (Instalment due		000 00	
1920)	• • • • • • •	900.00	• • • • • • •

	PRIOR APPROPRIA-	1920 APPROPRIA-	1920
	TIONS	TIONS	PAYMENTS
MISSIONARY SOCIETIES—Hos- PITALS (Cont'd)			
Board of Foreign Missions of the Presbyterian Church in the U. S. A. (Cont'd) (C.M. 2142) Shuntehfu hospital—Maintenance, \$750 per year for five years beginning 1916. (Balance due on previ- ous instalments) (Instalment due 1920).	\$437.50	\$750.00	
Board of Foreign Missions of the Reformed Church in America. (C.M. 2282) Hope and Wilhelmina hospital— Purchase of pump, well, and engine, and electric			
light plant	2,025.00		•••••
first year)		1,881.00	
1920)	• • • • • • • •	4,500.00	\$4,500.00
`pital—General purposes		6,000.00	6,000.00
Church of Scotland Foreign Mission Committee (C.M. 288) Ichang hospital—Equipment (C.M. 289) Ichang hospital—Support of third foreign doctor and nurse, \$2,250 per year for five	375.00		375.00
years beginning 1920. (Instalment due 1920).		2,250.00	750.00

	PRIOR APPROPRIA- TIONS	1920 APPROPRIA- TIONS	1920 PAYMENTS
MISSIONARY SOCIETIES—Hos- PITALS (Cont'd)	110113		
Domestic and Foreign Mission Society of the Protestant Episcopal Church in the U. S. A. (C.M. 2308) St. James hospital, Anking—Operating expenses, \$4,200 per year for five years beginning 1919. (Balance due on previous instalment)			\$2,025.00
(Instalment due 1920).		\$4,200.00	375.00
(C.M. 2361) St. James hospital, Anking—Resi- dence of physician			
Executive Committee of Foreign Missions of the Presbyterian Church in the U.S., South (C.M. 221, 2101) Soochow—Salary, outfit, and travel to field, of foreign nurse; Kashing—Salary outfit, and travel to field of foreign nurse. Salaries, \$3,600 per year for	v v d d d		
five years beginning 1915. (Balance due or previous instalments).	n		
Foreign Christian Missionary Society (C.M. 2327) Luchowfu hospital—Buildings an fixed equipment	ı d		5,000.00
(C.M.2328) Luchowfu hos pital—Movable equip ment	-		• • • • • • •
(C.M. 2329) Luchowf hospital—Maintenance \$4,100 per year for five years. (Instalment fo first year)	e r	4,100.00	•••••

	PRIOR APPROPRIATIONS	1920 APPROPRIA- TIONS	1920 PAYMENTS
MISSIONARY SOCIETIES—Hos-			
PITALS (Cont'd)			
Foreign Christian Missionary Society $(Cont'd)$			
(C.M. 2330) Luchowfu hospital—Salary of sec- ond foreign nurse, \$1,400 per year for five years. (Instalment for first year)		\$1,400.00	
(C.M. 2331) Luchowfu	*******	\$1,100.00	•••••
hospital—Salary of business manager, \$1,400 per year for five years. (Instalment for first		1 400 00	
year)	• • • • • • • •	1,400.00	• • • • • • • •
(C.M.215, 2100) Luchowfu hospital—Salary and allowance of doctor and nurse; Nantungchow hospital—Salary and allowance of nurse, \$4,200 per year for five years beginning 1918. (Balance due on previous instalment)	\$5,205.00		· ,
(Instalment due 1920).	• • • • • • • •	4,200.00	• • • • • • •
(C.M. 2218) Nantung- chow hospital—Support of second physician, \$8,400 extending over a period of five years. (In- stalment for first year)		1,800.00	
Foreign Mission Board of the Southern Baptist Convention (C.M. 228, 2106) Cheng- chow hospital—Salary of doctor, \$1,200 per year for five years begin- ning 1916. (Balance due on previous instal-			
ment)	2,050.00		
(Instalment due 1920)		1,200.00	• • • • • • •

	PRIOR APPROPRIA- TIONS	1920 APPROPRIA- TIONS	1920 PAYMENTS
MISSIONARY SOCIETIES-	2.02.10	220210	
Hospitals (Cont'd)			
Foreign Mission Board of the Southern Baptist Convention (Cont'd) (C.M. 281) Hwanghien hospital—Salary of physician, \$900 per year for five years. (Instalment for first			
year)(C.M. 282) Hwanghien	• • • • • • •	\$900.00	••••••
hospital—Outfit and travel of physician (C.M. 225, 2103)	\$750.00	•••••	
Hwanghien hospital— Salary of nurse, \$600 per year for five years beginning 1916. (Bal- ance due on previous			
instalments)	900.00		
(Instalment due 1920) (C.M. 280) Laichowfu hospital—Equipment		600.00	•••••
nospital — Equipment and outgoing expenses			
of physician and wife. (C.M. 279) Laichowfu hospital—Salary of physician and wife and nurse, \$1,650 per	750.00		
year for five years. (Instalment for first			
year)(C.M. 232, 2104) Yang-	•••••	1,650.00	
chow Hospital—Sal- ary of nurse, \$600 per year for five years be- ginning 1916. (Bal- ance due on previous			
instalments) (Instalment due 1920)	1,025.00	600.00	
London Missionary Society (C.M. 2167) Siaochang hospital—Support of nurse, \$600 per year for five years. (In-	••••	000.00	
stalment for first year)		600.00	
July	• • • • • • • •	000.00	• • • • • • •

	PRIOR APPROPRIA- TIONS	1920 APPROPRIA- TIONS	1920 PAYMENTS
MISSIONARY SOCIETIES— HOSPITALS (Cont'd)	220	22021.0	
London Missionary Society (Cont'd)			
(C.M.2326) Tsangchow hospital—Support of nurse, \$750 per year for five years begin-			
ning 1918. (Instal- ment due 1919) (Instalment due 1920)	\$750.00	\$750.00	
Medical Mission Auxiliary of London (C.M. 2201) Tai Yuan Fu hospital—Im-			
provements and supplies	3,150.00		\$1,447.78
United Free Church of Scotland (C.M. 2232) Mukden hospital—Support of nurse, \$750 per year for five years begin- ning 1918. (Instal-			
ment due 1919)	750.00	750.00	• • • • • • •
(Instalment due 1920) University of Nanking (C.M. 2137) Nanking hospital—Current ex- expenses, \$9,250 per year for five years beginning 1917. (In-		750.00	
stalment due 1919) (Instalment due 1920)	9,250.00	9,250.00	
Women's Foreign Mission- ary Society of the Methodist Episcopal Church (C.M. 2359) Kiukiang hospital—Salary of nurse, \$500 per year for five years begin- ning 1919. (Balance due on previous in-			
stalment) (Instalment due 1920)		500.00	342.50
(Instantent due 1920)	,	500.00	

PRIOR APPROPRIA- TIONS	1920 APPROPRIA- TIONS	1920 PAYMENTS
\$195,820.76	\$145,000.00	\$7,980 .88
)	0.000.00	1 001 00
1,131.33	2,000.00	1,281.20
	3,000.00 2,500.00	3,000.00
·	25,000.00	
	\$195,820.76	APPROPRIATIONS \$195,820.76 \$145,000.00 1,131.33 2,000.00 3,000.00

	PRIOR APPROPRIA- TIONS	1920 Appropria- tions	1920 PAYMENTS
Missionary Societies— Hospitals and Pre- Medical Education (Cont'd)		110115	TAIMENIS
Yale Foreign Missionary Society (Cont'd) (C.M. 2455) Hunan-Yale Medical School, Changsha—Salaries and expenses of staff of hospital, pre-medical school, and nurses' training school, \$6,645 per year for five years beginning July1, 1920 (Instalment due 1920)		\$6,645.00	
Pre-Medical Education Canton Christian College (C.M. 2443) Equip-		,	
ment	• • • • • • • •	10,000.00	
ces. Mex. $$25,500$		30,000.00	\$20,718.75
(C.M. 2445) Salaries of two professors and one instructor. Mex. \$10,200 per year for five years beginning 1920. (Instalment due 1920) Fukien Christian Univer-		12,000.00	7,803.00
sity (C.M. 2273) Building and equipment for science department (C.M. 2274) Salaries of six instructors,\$10,000	\$50,000.00		27,084.00
per year for five years beginning 1919. (In- stalment due 1920) (C.M. 2275) Salaries of Chinese instructors,		10,000.00	10,000.00
\$2,700 per year for five years beginning 1919. (Instalment due 1920)		2,700.00	2,700.00

EXHIBIT J-Conitnued

	PRIOR APPROPRIA- TIONS	1920 APPROPRIA- TIONS	1920 PAYMENTS
PRE-MEDICAL EDUCATION			
Fukien Christian University (Cont'd) (C.M. 2276) Mainte-			
nance of science de- partment, \$10,000 per year for five years beginning 1919. (In- stalment due 1920)		\$10,000.00	\$10,000.00
Ginling College (C.M. 2402) Salary of teacher of physics, \$2,400 per year for five years beginning 1920. (Instalment			
due 1920)`		2,400.00	• • • • • • •
(C.M. 2403) Purchase of scientific equip-	\$5,000.00		
ment	\$5,000.00	******	
Shanghai (C.M. 2415) Mainte- nance expenses, \$18,- 800 extending over a period of four years			
beginning 1920. (In-			
stalment due 1920)		3,000.00	3,000.00
(C.M. 2416) Construc- tion and equipment of laboratory building		60,000.00	60,000.00
(C.M. 2457) Salary of		,	,
instructor for year 1920–21	• • • • • • •	1,500.00	1,500.00
MEDICAL EDUCATION			
Medical Schools—Unaf-			
filiated			
Shantung Christian University			
(C.M. 252) Expense			
of educating stu- dents sent to Tsin-			
anfu by the China			
Medical Board dur-			
ing a period of five years	10,000.00		10,000.00

	PRIOR APPROPRIA- TIONS	1920 APPROPRIA- TIONS	1920 PAYMENTS
Medical Education Medical Schools—Unaffiliated (Cont'd) Shantung Christian University (Cont'd) (C.M. 2217, 2358) To cover loss in exchange in connection with appropriations C.M. 251 and		1000	
C.M. 252 Yale Foreign Missionary Society	\$48,236.55	•••••	\$30,000.00
(C.M. 27) Support of Hunan-Yale Med- ical School, Chang- sha, \$16,200 per year for five years beginning 1915. (Balancedue on pre- vious instalment)	8,100.00		8,100.00
(C.M.2230) Support of Hunan-Yale Med- ical School, Chang- sha, \$9,000 extend- ing over a period of three years begin- ning 1917. (Instal- ment due 1919)	2,000.00		2,000 .00
(C.M. 2231) Support of third instructor in premedical department of Hunan-Yale Medical School, \$6,200 extending over a period of three years beginning 1917. (Instruction of the control o	1 500 00		1 500 00
stalment due 1919). (C.M. 2414) To cover loss in exchange in connection with ap-	1,500.00	•••••	1,500.00
propriations C.M. 27 and 2230		6,937.50	6,937.50

	PRIOR APPROPRIA- TIONS	1920 appropria- tions	1920 PAYMENTS
MEDICAL EDUCATION (Cont'd)	HONS	110115	TAIMENIS
Medical Schools—			
Affiliated Peking Union			
Medical			
College			
Asset Ac- counts			
Purchase of	-		
additional			
property (C.M. 213,			
248, 249,			
2170, 2213, 2336, 2381).	\$86,353.49		e 0 029 69
Buildings and	Ф00,000.49	• • • • • • • •	\$9,938.62
fixed equip-			
ment (C.M.			
2401, 2406, 2491, 2492).	327 356 43	\$2,434,234.96	2 405 050 50
Alterations to	021,000.40	Ψ2,±0±,20±.00	2,100, 303.03
original build-			
$\underset{\text{0.007}}{\text{ings}}$ (C.M.		40.046.00	15 411 00
2407)		40,846.08	17,411.38
Street improve- ments (C.M.			
$2408)\ldots$		9,000.00	
Movable equip-			
ment (C.M. 2339, 2355,			
2409)	282,257.38	229,000.00	167,900.42
Accessories	•	,	, , , , , , , , , , , , , , , , , , , ,
(C.M. 2340,	149,068.21	61 000 00	102 205 05
2356, 2410). Heavy furni-	149,005.21	61,000.00	123,325.25
ture for staff			
residences	14 200 07		0.000.07
(C.M. 2378) Library (C.M.	14,388.25	• • • • • • •	6,209.07
2334, 2411,			
2433, 2440).	825.01	$\boldsymbol{55,}966.96$	41,441.52
Operation in China			
Budget 1918-			
19 (C.M.	4		
$2377)\ldots$	$8,\!529.53$		

	PRIOR APPROPRIA- TIONS	1920 APPROPRIA- TIONS	1920 PAYMENTS
MEDICAL EDUCATION (Cont'd)	220110	220115	111111111111111111111111111111111111111
Medical Schools— Affiliated (Con	$d^{\prime}d)$		
Operations in	,		
China (Cont'd) Budget 1919-)		
20 (C.M. 2341, 2412,			
$2493)\ldots$	\$106,843.38	\$251,000.00	\$357,125.43
Budget 1920– 21 (C.M.			
2441) Peking Ameri-		350,000.00	115,254.05
can School (C.M. 2442)		50,000.00	
Expenses in	• • • • • • •	30,000.00	
America July 1, 1919, to			
June 30,1920 (C.M. 2342,			
2426) July 1, 1920, to	2,243.58	5,000.00	5,172.63
June 30,1921			
(C.M. 2481, 2475)		10,000.00	5,507.50
Shanghai Medi- cal School as-			
set accounts Purchase of			
land (C.M. 2110, 2269,			
$2429)\ldots$	193,022.84		18,607.58
Buildings and fixed equip-			
$egin{array}{ll} { m ment} & { m (C.M.} \ 2270, 2413) . \end{array}$	18,271.62	50,000.00	4,102.89
Movable equip-	10,211.02	00,000.00	1,102.00
$\begin{array}{c} \mathrm{ment} \ (\mathrm{C.M.} \\ 2271) \dots \end{array}$	5,000.00		39.76
$\begin{array}{c} { m Accessories} \\ { m (C.M.2272)} \end{array}$	4,960.24		
$\begin{array}{c} \text{Library (C.M.} \\ 2215) \dots \dots \end{array}$	2,376.15		47.20
Operation Budget 1918-	,		
19 (C.M.	£ 960 00		1 ()1() ()1
2259, 2277).	5,268.88		1,010.81

PRIOR	1920	
		1000
		1920 PAYMENTS
TIONS	TIONS	PAIMENIS
,	\$600.00	\$395.90
\$12,000.00	• • • • • • • • • • • • • • • • • • • •	10,723.86
•••••	12,000.00	• • • • • •
22,148.93	19,550.00	$22,\!227.85$
11,855.29	8,420.00	6,867.40
	45,000.00	
	\$12,000.00 22,148.93 11,855.29	\$12,000.00

	PRIOR APPROPRIA- TIONS	1920 APPROPRIA- TIONS	- 1920 PAYMENTS
$egin{aligned} ext{Miscellaneous} \ & (Cont'd) \end{aligned}$			
Smithsonian Insti- tution (C.M. 2431) For studies in phys- ical anthropol- ogy in China	:		
and other countries	• • • • • • • • •	\$2,500.00	\$2,500.00
ADMINISTRATION			
Peking Office (C.M. 2424–2473) Home Office (C.M.	\$6,612.72	41,303.48	28,021.82
2425)		40,716.00	28,240.65
Totals	\$1,775,618.53	\$4,249,228.23	\$3,641,595.90
Unexpended balances of appropriations	0.40 500 00	000 170 07	
allowed to lapse	340,758.83	338,173.87	
NET TOTALS ¹	\$1,434,859.70	\$3,911,054.36	\$3,641,595.90

 $^{^1{\}rm The}$ Foundation appropriated to the China Medical Board for its work during the year 1920 the sum of \$4,105, 550.

	PRIOR APPROPRIA-	1920 APPROPRIA-	1920
T T T	TIONS	TIONS	PAYMENTS
International Health Board.	\$360,436.23	\$2,420,099.41	\$1,623,375.20
CHINA MEDICAL BOARD	1,434,859.70	3,911,054.36	3,641,595.90
MEDICAL EDUCATION	$9,\!452.05$	1,014,096.66	836,328.10
MENTAL HYGIENE	3,843.27	109,000.00	93,509.95
RESEARCH IN PHYSICS AND CHEMISTRY	3,542.11	120,000.00	50,466.77
School of Hygiene and Public Health	309,650.78	324,154.00	330,220.55
War Work	55,839.27	• • • • • • • • • • • • • • • • • • • •	20,663.97
MISCELLANEOUS	35,225.78	1,320,031.91	276,603.11
Administration	4,722.30	200,370.42	205,092.72
Totals	\$2,217,571.49	\$9,418,806.76	\$7,077,856.27
Prior Appropriations		\$2,217,571.49	
1920 Appropriations		9,418,806.76	
Total Appropriations	• • • • • • • • • • • • • • • • • • • •		\$11,636,378.25
1920 Payments	•••••		7,077,856.27
Balance Payable on Appropriation	ıs		\$4,558,521.98

EXHIBIT K-Continued

In addition to the foregoing, the Foundation has made pledges and appropriations which become effective in future years,¹ and will require for payment the following amounts

YEAR 1921:

International Health Board.	\$2,500,000.00	
China Medical Board	1,815,787.00	
Medical Education	4,571,250.00	
Mental Hygiene	103,500 .00	
RESEARCH IN PHYSICS AND CHEMISTRY	115,000.00	
School of Hygiene and Public Health	250,000.00	
Miscellaneous	354,472.44	\$9,710,009.44
Year 1922		3,229,226.13
Year 1923		2,005,551.00
Year 1924		2,531,726.00
Year 1925		1,083,600.00
Year 1926		35,000.00
	ς.	\$18,595,112.57

¹Full information in connection with these pledges is contained in the President's Review.

EXHIBIT L

Statement of Appropriations and Payments of Special Funds During the Year 1920

	PPROPRIA- TIONS	PAYMENTS
ESTATE OF LAURA S. ROCKEFELLER FUND		
(R.F. 2454) Fifth Avenue Baptist Church	\$212,688.86	\$184,000.00
LAURA S. ROCKEFELLER FUND		
(R.F. 2444) Baptist Home for the		
Aged of New York City	\$500.00	\$500.00
(R.F. 2442) Baptist Home of Northern	700.00	700.00
Ohio	500.00	500.00
(R.F. 2443) Euclid Avenue Baptist Church of Cleveland, Ohio (R.F. 2441) Ministers and Missiona-	1,500.00	1,500.00
ries Benefit Board of the Northern		
Baptist Convention		500.00
	\$3,000.00	\$3,000.00
John D. Rockefeller Fund	•	
(R.F. 2445, 2446) Baptist Home for		
the Aged of New York City	\$1,850.00	\$1,850.00

EXHIBIT M

STATEMENTS OF PRINCIPAL FUNDS

GENERAL FUND

Balance of Mr. Rockefeller's gifts December 31, 1920	171,204,624.50
The whole fund is invested in securities (Exhibit P).	
Reserve	
Balance December 31, 1919	\$2,712,670.96 398,617.60
Total	3,111,288.56
The whole fund is invested in securities (Exhibit P).	
Laura S. Rockefeller Funds	
Gifts comprising four separate funds	\$49,300.00
The total of these funds is invested in securities (Exhibit Q).	
John D. Rockefeller Fund	
John D. Rockefeller Fund	\$37,000.00
	\$37,000.00
Gifts	
Gifts	
Gifts The whole fund is invested in securities (Exhibit Q). Henry Sturgis Grew Memorial Fund Gift to Harvard Medical School of China, trans-	
Gifts. The whole fund is invested in securities (Exhibit Q). Henry Sturgis Grew Memorial Fund Gift to Harvard Medical School of China, transferred to the Foundation in trust	\$25,000.00
Gifts The whole fund is invested in securities (Exhibit Q). Henry Sturgis Grew Memorial Fund Gift to Harvard Medical School of China, transferred to the Foundation in trust The whole fund is invested in securities (Exhibit Q).	\$25,000.00

EXHIBIT N

LAND, BUILDINGS, AND EQUIPMENT FUNDS

	NET EXPENDITURES TO DECEMBER 31, 1919	EXPENDITURES	NET EXPENDITURES TO DECEMBER 31, 1920
The Rockefeller Foundation Grand Chenier Wild Life Refuge This property was deeded to the state of Louisiana in accordance with resolu- tions of the Board dated December 3, 1919, Septem- ber 28, 1920, and January 21, 1921, at a book value of \$248,420.72.	\$243,999.70	\$4,421.02	
LibraryEquipment	2,094.90 14,849.86	$\substack{466.66\\6,919.33}$	\$2,561.56 21,769.19
TOTAL, The Rockefeller Foundation	\$260,944.46	\$11,807.01	\$24,330.75
CHINA MEDICAL BOARD Peking Union Medical College: Original purchase Additional land New buildings Alterations—original buildings Movable equipment Accessories Heavy furniture for staff residences Library TOTAL, Peking Union Medical College Shanghai Medical School: Land New buildings	\$178,772.77 180,087.78 3,872,643.57 81,353.92 42,742.62 40,931.79 611.75 23,208.03 \$4,420,352.23 \$251,977.16	\$9,938.62 2,405,959.59 17,411.38 167,900.42 123,325.25 6,209.07 41,441.52 \$2,772,185.85	\$178,772.77 190,026.40 6,278,603.16 98,765.30 210,643.04 164,257.04 6,820.82 64,649.55 \$7,192,538.08
New buildings Movable equipment Accessories Library	$ \begin{array}{r} 31,728.38 \\ & 39.76 \\ & 623.85 \end{array} $	4,102.89 39.76 47.20	35,831.27 39.76 39.76 671.05
TOTAL, Shanghai Medi- cal School	\$284,369.15	\$22,797.43	\$307,166.58
Harvard Medical School	\$28,800.00		\$28,800.00
TOTAL, China Medical Board	\$4,733,521.38	\$2,794,983.28	\$7,528,504.66
GRAND TOTAL	\$4,994,465.84	\$2,806,790.29	\$7,552,835.41
20			

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EXHIBIT N—Continued

LAND, BUILDINGS, AND EQUIPMENT FUNDS-Continued

SUMMARY

E-man 1:4-man	
Expenditures To December 31, 1919 Year 1920	\$4,994,465.84 2,806,790.29
Total	\$7,801,256.13
Grand Chenier Tract deeded to state of Louisiana	248,420.72
NET TOTAL DECEMBER 31, 1920	\$7,552,835.41

EXHIBIT 0

STATEMENTS OF TRANSACTIONS RELATING TO INVESTED FUNDS

GENERAL FUND

SECURITIES SOLD, REDEEMED, OR EXCHANGED

	\$22,732.80 50,000.00 345.85 1,250.00		962.50	125.00 23,838.03	65,432.50	130,617.78 83,710.99 18,440.70 53,095.17
	Gain Loss Gain Gain		Gain	Gain · Gain	Gain	Gain Gain Gain Gain
TOTAL	\$599,250.00 500,000.00 36,000.00 500,000.00	63,180.00	345,275.00 Gain	50,000.00 Gain 69,858.03 Gain	385.00 93,932.50 Gain	22,317.39 330,617.78 162,524.23 32,740.78 63,071.69
RATE PER CENT	ರ ರಿ 4 ರ ರ		10 140	rO		
NAME	AUZESE			.4B." 156 Shares Borne Scrymser Co. Capital. 220 Shares Chehalis & Pacific Land Co.: Liquidating div-		shares new stock sold. 426 Shares Solar Refining Co. Capital. 52 Shares Standard Oil Co. (Kansas). 142 Shares Standard Oil Co. (Kentucky).
	#500,000 #500,000 #36,000 #500,000 #81,000	\$350,000	\$50,000	12	1	4,0 4

TREASURER'S REPORT

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EXHIBIT O—Continued

STATEMENT OF TRANSACTIONS RELATING TO INVESTED FUNDS—Continued

General Fund—Continued

Securities Sold, Redeemed, or Exchanged—Continued

TOTAL

	\$4,381.83					43,684.45				\$398,617.60
	Gain					Gain				
PROCEEDS	\$415,873.35 Gain		24,500.00		102.528.00	70,612.45		73,912.03	15,000.00	\$3,571,578.23
NAME	4,000 Shares Standard Oil Co. (New Jersey) Cumulative Preferred	Standard Oil Co. (New Jersey): Value of rights to subscribe to 49,000 shares new Preferred, charged	against said Preferred and credited to cost of Common (See contra)	Standard Oil Co. (Ohio): Value of rights to subscribe to 17,088 shares new Preferred, charged against	said Preferred and credited to cost of Common (See contra)	132 Shares Standard Oil Co. (Ohio)	24,000 shares new Preferred, sold and proceeds cred-	ited to cost of Common		TOTALS

EXHIBIT O-Continued

Securities Purchased or Received through Exchange

cosT \$21,375.00			20,250.00	4,924,500.00	1,811,328.00	\$6,838,232.97
PRICE PER CENT 225.	0	90.953	100.	100.5	106.	
Shares Cleveland Trust Co	\mathbf{z}	Dalance stated as cost of stock	02	20	per share, to which has been added the market value of rights at \$6.00 per share 106.	Total
95	1 899	$202\frac{1}{3}$	49,000	17,088		

EXHIBIT P

SCHEDULE OF SECURITIES IN GENERAL FUND ON DECEMBER 31, 1920, REPRESENTING BOTH PRINCIPAL AND INCOME TEMPORARILY INVESTED

BONDS

NAME	RATE DATE OF PER CENT	DATE OF MATURITY	DF TT	AMOUNT	PRICE PER CENT	AMOUNT PER CENT CASH PRICE
American Agricultural Chemical Co. First Mortgage	ಸಂ	Oct. 1	928	1928 \$310,000 101.	101.	\$313,100.00
American lelephone & lelegraph Co. Innry-rear Collateral Trust. Armour & Co. Real Estate First Mortgage	7 4 :	Dec. 1 June 1	1946 1939	1,000,000 93.25	97.75 93.25	97,750.00 932,500.00
Ashland Power Co. First Mortgage. Atlantic & Birmingham Ry. First Mortgage.	ນ		1928 1934	8 8,000 100. 4 677,000 90.	100. 90.	8,000.00 609,300.00
Datumore & Onto P.A. Relunding and General Mortgage Chicago & Alton B.R. Refunding Mortgage	10 co			650,000	99.75 65.	648,375.00 358,150.00
Chicago & Alton Ry. First Lien. Chicago City & Connecting Railways Collateral Trust	3. 5.23	July 1 Jan. 1	1950 1927	854,000 5 1,305,000 8	53. 85.	452,620.00 $1,109,250.00$
Chicago & Eastern Illinois K.K. Ketunding and Improvement Mortgage.	4	July 1	1955	300,000 63.	63.	189,000.00
Chicago, Milwaukee & St. raul hy. General Morgage Series "A".	4	May 1	1989	30,000 97.	97.	29,100.00
Chicago, Milwaukee & St. raul hy. Ceneral Molegage Series "C" Chicago, Milwaukee & St. Paul Ry. Debenture	4 4	May 1 July 1	1989 1934	500,000 103. 450,000 88.	500,000 103. 450,000 88.2838	515,000.00 397,277.50

455,312.50 47,500.00	81,600.00 $485,000.00$	65,700.00	587,250.00 475,000.00	1,600,000.00	795,742.30 261,000.00 1,695,000.00	2,777,082.75 100,000.00 805,620.00 1,539,160.00 1,809,000.00	1,113,000.00 144,812.50 250,000.00
500,000 50,000 95.	102. 97.	.06	83.893 95.	000,000 80. 500,000 94.565	74.7175 87. 96.8571	97.5 100. 87. 92.	84. 82.75 100.
500,000	80,000 102. 500,000 97.	73,000 90.	700,000	2,000,000	1,065,000 74.7175 300,000 87. 1,750,000 96.8571	2,848,290 97.5 100,000 100. 926,000 87. 1,673,000 92. 1,809,000 100.	
Jan. 2014 Aug. 15 '26	1933 1927	1990	1993 1961	1934 1931	1953 1955 1966	1941 1941 1997 1931 1937	1936 2000 1947
Jan. Aug.	May Feb.	Nov.	June Apr.	Aug. Apr.	Apr. Nov. Jan.	Oct. July June May Jan.	Jan. Dec. Nov.
4 2 2 2 2 2 2 2 2	ကက	4	44	ကေ	443	ರಿ ಸು ಟ್ರ 4 ರಿ	44 65 53 112 112
Chicago, Milwaukee & St. Paul Ry. General and Refunding Mortgage Series "A". Chicago & North Western Ry: Extension. Chicago & North Western Py: Extension.	Chicago & Morter Western Ly, Minking Fund Debon- ture Chicago Railways Co. First Mortgage Clereford Chicago & St. Clereford	Louis Division College of Trust. Cleveland, Cincinnati, Chicago & St. Louis By Gen-	eral Cleveland Short Line Ry. First Mortgage	Colorado Industrial Co. First Mortgage Dominion of Canada, Government of, Fiften-Year. Fig. D. Com M. M. Colorado, Colorado de Colorado	Series "B" Series "B" Series "B" Illinois Central R.R. Refunding Mortgage Interborough Rapid Transit Co. First Mortgage International Magnetics Mortgage	lateral Trust Sinking Fund Late Erie & Western R.R. Second Mortgage Lake Shore & Michigan Southern Ry. First Mortgage Lake Shore & Michigan Southern Ry. First Mortgage Lake Shore & Michigan Southern Ry. Debenture Magnolia Petroleum Co. First Mortgage	Missouri, Kansas & Texas Ry. General Mortgage Sinking Fund. Morris & Essex R.R. First and Refunding Mortgage. Mutual Fuel Gas Co. First Mortgage.

EXHIBIT P—Continued SCHEDULE OF SECURITIES—Continued

Per Cent Maturity
$4\frac{1}{2}$ July Jan.
5 Oct.
$4\frac{1}{2}$ Jan. '21-'28
4 May
H #H
122
$\frac{4}{2}$ June
$4\frac{1}{2}$ Aug.

EXHIBIT P—Continued SCHEDULE OF SECURITIES—Continued STOCKS

NAME	1920 Divi- dend Rate Per Cent	NUMBER OF SHARES	PRICE PER SHARE	Саѕн Рисе
American Ship Building Co. Preferred Anglo-American Sip Building Co. Common Anglo-American Oil Co., Ltd. (Par £1) Capital Atchison, Topeka & Santa Fe Ry. Preferred Atchison, Topeka & Santa Fe Ry. Common Borne-Scrymser Co. Capital The Buckeye Pipe Line Co. (Par \$50) Capital Central National Bank of Cleveland Capital Chelais & Pacific Land Co. Capital Chesebrough Manufacturing Co. Consolidated Common Chicago City & Connecting Ry. Participation Certificates Preferred Connon Cleveland Arcade Co. Capital Cleveland Arcade Co. Capital Colorado & Southern Ry. First Preferred Consolidated Gas Co. of N. Y. Capital The Continental Oil Co. Capital The Continental Oil Co. Capital The Crescent Pipe Line Co. (Par \$50) Capital	7 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	9,303 14,957 366,517 5,000 21,000 21,000 2,070 2,070 2,070 2,000 2,000 14,120	85. 35. 30.5 98.25 98.25 98.25 98.25 160. 159.222 35.1245 220.5025 69.1875 30. 30. 38.6222 234.904 54.	\$790,755.00 11,573,768.50 14,1250.00 2,009,908.33 42,480.00 7,950,880.00 7,727.40 456,440.30 1,212,856.88 315,540.00 246,555.56 89,498.77 378,000.00 1,279,182.61 847,200.00

Cumberland Pipe Line Co. Capital	12	3,000	81.333	244,000.00	
Erie R.R. First Preferred		21,400	45.8306	980,773.76	
Eureka Pipe Line Co. Capital	13	12,357	361.3331	4,464,995.59	
Galena Signal Oil Co. Preferred.	00	4,193	139.7	585,779.50	
Galena Signal Oil Co. Common			189.7031	3,794,059.59	
Great Lakes Towing Co. Preferred	2	1,527	88.7361	135,500.05	
ing Co. Common	ಸಾ		12.	14,400.00	
e Co. (Par \$50) Capital	20	24,845	125.111	3,108,385.28	
king Coal & Coke Co. Preferred	2	202	100.	20,250.00	
Kanawha & Hocking Coal & Coke Co. Common		$\frac{7}{899}$	90.953	60,779.97	
Manhattan Ry. Capital	2	10,000 1	128.775	1,287,750.00	
Missouri Pacific R.R. Voting Trust Certificates for Convertible			;		
		21,980	55.5	1,219,890.00	
National Lead Co. Preferred	2	1,100	104.	114,400.00	
National Lead Co. Common	9		50.	500,000.00	
National Transit Co. (Par \$12.50) Capital	30		28.5	3,604,708.50	
New York, Chicago & St. Louis R. R. Second Preferred	731		78.70	31,480.00	
ago & St. Louis R. R. Common			55.	5,500.00	
New York Transit Co. Capital	20	12,392	300.	3,717,600.00	
Northern Pacific Ry. Common	7	,700	91.7625	64,233.75	
•	10	000'6	110.	00.000,066	
Pere Marquette Ry. Preferred		5,7404	54.56	313,248.00	
Provident Loan Society Certificates (Par \$5,000)	9		100.	200,000.00	
le Ry. Preferred		4,300	54.	232,200.00	
Seaboard Air Line Ry. Common			21.	71,400.00	
Sheffield Farms Co., Incorporated Preferred	9		99.4	14,910.00	
The Solar Refining Co. Capital	20		185.007	839,561.76	
:	17		229.5556	5,703,308.88	
South West Pennsylvania Pipe Lines Capital	6	8,000	160.	1,280,000.00	
					53

EXHIBIT P—Continued SCHEDULE OF SECURITIES—Continued STOCKS

Name	1920 Dividend Rate Per Cent	NUMBER OF SHARES	Price Per Share	Савн Рисе
Standard Oil Co. (Indiana) Capital The Standard Oil Co. (Kentucky) Capital Standard Oil Co. (Kentucky) Capital Standard Oil Co. (Nebraska) Capital Standard Oil Co. (New Jersey) Non-voting Cumulative Preferred Standard Oil Co. (New Jersey) Common The Standard Oil Co. (Ohio) Non-voting Cumulative Preferred Superior Savings & Trust Co. Capital Tilden Iron Mining Co. Capital Tilden Iron Mining Co. Capital Union Tark Car Co. Common Virginia-Carolina Chemical Co. Common Washington Oil Co. (Par \$10) Capital Western Maryland Ry. Second Preferred Western Pacific R. R. Corporation Preferred Western Pacific R. R. Corporation Common Wison Realty Co. Capital	22 22 25 25 25 25 25 25 25 25 25 25 25 2	29,718 4,914 14,726 12,482 2,482 55,000 16,956 17,780 1,780 22,000 35,000 1,774 1,77	867. 275.016 70.2547 270. 270. 272. 204. 108.5555 27.35 27.35 66.917 66.917 67. 46. 46. 41.5 15.25 1100.	\$25,765,506.00 1,351,433.05 1,034,570.71 670,140.00 5,658,008.48 35,745,500.00 3,459,024.00 1,811,328.00 89,350.00 89,350.00 23,45,000.00 23,220.00 23,220.00 23,220.00 23,220.00 23,220.00 23,220.00 23,220.00 23,220.00 23,220.00 23,220.00 23,220.00 23,220.00 23,220.00 23,220.00 23,220.00 23,220.00
TOTAL STOCKS				\$145,118,658.87

EXHIBIT P-Continued

SCHEDULE OF SECURITIES—Continued

SUMMARY

Bonds \$34,161,148.87 Stocks 145,118,658.87	Total book value of investments belonging to General Fund, principal and income	The foregoing investments are apportioned as follows: \$171,204,624.50 4,963,894.68 4,963,894.68 5,111,288.56 1,11,288.56	
Bonds	Total book value of investments belonging to Gene	The foregoing investments are apportioned as follows: General Fund General Fund Income Reserve. Total.	

SCHEDULE OF SECURITIES IN SPECIAL FUNDS ON DECEMBER 31, 1920 EXHIBIT Q

JOHN D. ROCKEFELLER FUND

BONDS

NAME	RATE PER CENT	DATE OF MATURITY	AMOUNT	PRICE PER CENT	RATE DATE OF AMOUNT PER CENT CASH PRICE
Canada Southern Ry. Consolidated Mortgage Series "A".	7.0	Oct. 1962 \$37,000 100.	\$37,000	100.	\$37,000.00
Total Bonds		:			\$37,000.00
C	£				

LAURA S. ROCKEFELLER FUND

BONDS

			-			
Colorado Industrial Co. First Mortgage	ကက	Aug. Dec.	1934 1923	1934 \$50,000 80. 1923 10,000 93.	80. 93.	\$40,000.00 9,300.00
Total Bonds		:	:			\$49,300.00

HENRY STURGIS GREW MEMORIAL FUND

	2000				
United States Second Liberty Converted	47	Nov. 15'42 \$25,850 96.71167	\$25,850	96.71167	\$25,000.00
Total Bonds					\$25,000.00
				-	
ARTHUR THEODORE LYMAN ENDOWMENT	E LYMAN F	CNDOWMENT			
BO	BONDS				
United States Fourth Liberty	44	Oct. 15 '38	\$5,850	\$5,850 94.01709	\$5,500.00
Total Bonds					\$5,500.00

60 7

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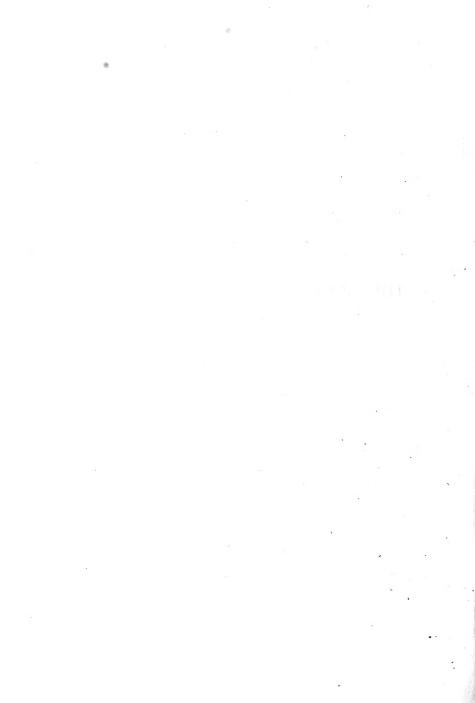
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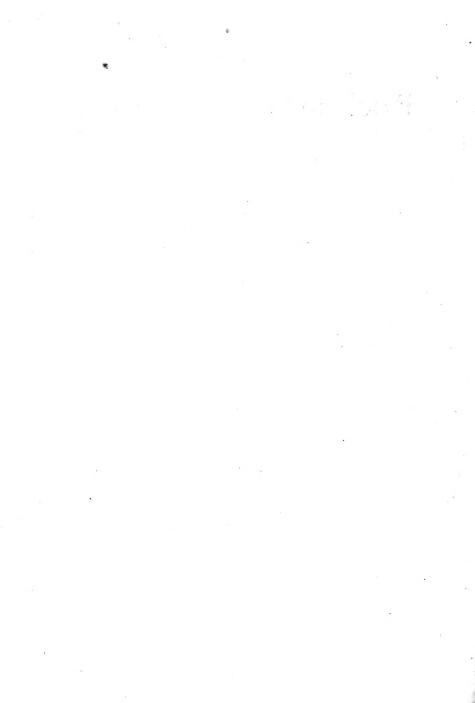


The Rockefeller Foundation

Annual Report

1921

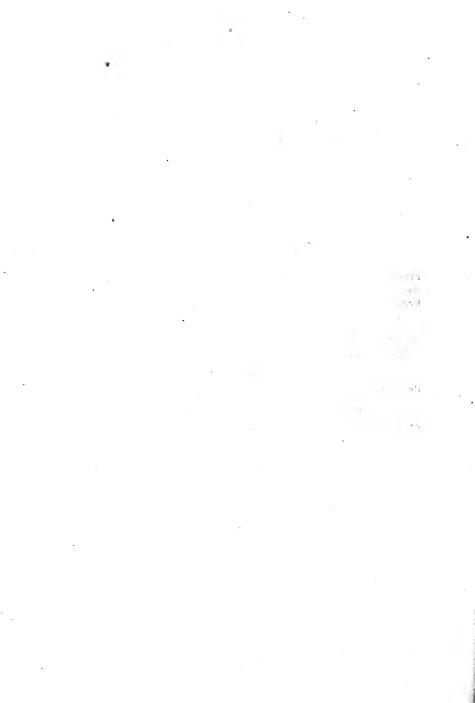
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^{*}Resigned February 28, 1921 **Died April 4, 1921.

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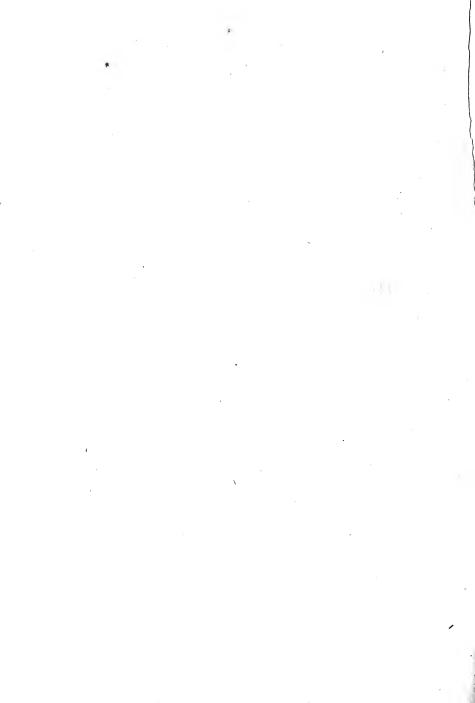
Director of Information Service CHARLES C. WILLIAMSON

^{*} Died January 25, 1922.

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THE ROCKEFELLER FOUNDATION

President's Review



To the Members of the Rockefeller Foundation: Gentlemen:

I have the honor to transmit herewith a general review of the work of the Rockefeller Foundation for the period January 1, 1921, to December 31, 1921, together with the detailed reports of the Secretary and the Treasurer of the Foundation, the General Director of the International Health Board, the Director of the China Medical Board, and the General Director of the Division of Medical Education.

Respectfully yours,

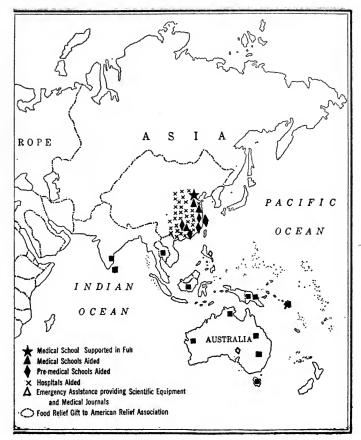
GEORGE E. VINCENT,

President.



Fig. 1.—Map of World-wide Activities of

It is the purpose of the Rockefeller Foundation and its departmental boards to have a part in the world-wide movement for preventing disease and bringing about improved conditions of health. In 1921 aid was extended to five medical schools in Canada, to one in England, one in Belgium, one in Brazil, and one in the United States. In China a modern medical school in Peking was supported in full and three other medical schools, five pre-medical schools, and twenty-nine hospitals aided. Two million dollars were given to Harvard for a school of public health; and the School of Hygiene and Public Health at Johns Hopkins University, and courses in hygiene at São Paulo, Brazil, supported. A campaign against yellow fever was continued in Mexico and Central and South



the Rockefeller Foundation

America. Aid was given to ten southern states and two foreign countries to continue the work of malaria control. In seventy-seven counties in sixteen southern states, county health organization on a full-time basis was promoted in co-operation with state and local agencies. Hookworm work, now merged in county health programs in the Southern States, was prosecuted abroad in eighteen governmental areas. Anti-tuberculosis work in France was brought close to the point of complete transfer to French agencies. The 1920 gift of \$1,000,000 for the relief of European children was completed. Emergency assistance in the form of scientific journals and apparatus for medical schools was continued in five countries and extended to four other countries in Europe

PRESIDENT'S REVIEW

The Year in Brief

During the year 1921 the Rockefeller Foundation (1) continued a quarter-million annual appropriation to the School of Hygiene and Public Health of Johns Hopkins University, (2) pledged two million to Harvard for a school of health, (3) contributed to public health training in Czechoslovakia, Brazil, and the United States, (4) aided the Pasteur Institute of Paris to recruit and train personnel, (5) promoted the cause of nurse training in America and Europe, (6) underwrote an experimental pay clinic in the Cornell Medical School, (7) formally opened a complete modern medical school and hospital in Peking, (8) assisted twenty-five other medical centers in China, (9) promised a million dollars for the medical school of Columbia University, (10) contracted to appropriate three and one half millions for the rebuilding and reorganization of the medical school and hospital of the Free University of Brussels, (11) made surveys of medical schools in Japan, China, the Philippines, Indo-China, Straits Settlements, Siam, India, Syria, and Turkey, (12) supplied American and British medical journals to 112 medical libraries on the Continent, (13) supplemented the laboratory

equipment and supplies of five medical schools in Central Europe, (14) defrayed the expenses of commissions from Great Britain, Belgium, Serbia, and Brazil, (15) provided 157 fellowships in hygiene, medicine, physics and chemistry, to representatives of eighteen countries, (16) continued a campaign against yellow fever in Mexico, Central and South America, (17) prosecuted demonstrations in the control of malaria in ten states, (18) co-operated in hookworm work in nineteen governmental areas, (19) participated in rural health demonstrations in seventy-seven American counties and in Brazil, (20) neared the goal of transferring to French agencies an antituberculosis organization in France, (21) provided experts in medical education and public health for counsel and surveys in many parts of the world, and rendered sundry minor services to governments and voluntary societies. These were done in part by the Foundation directly, but chiefly through its departmental agencies the International Health Board, the China Medical Board, and the Division of Medical Education.

Telescope and Microscope

"Cure looks through the microscope, prevention through the telescope" is the clever phrasing of a successful American health officer. If the figure is not too closely examined it serves its

purpose. There has been and still is a marked difference between the average physician's point of view and the sanitarian's. The former deals with disease which has manifested itself; the latter seeks to foresee and to forestall its occurrence. The one thinks of the individual patient, the other of the community as a whole.

It is sometimes cynically asserted not only that the attitudes of the two differ, but that their interests clash. In a town from which malaria had been banished, a local doctor who had almost specialized in chills and fever was asked how his profession had been affected. "If it hadn't been for the influenza we'd have gone broke; that saved us," was the half-jocular reply. If the two things are looked at narrowly, locally, and for a brief period, there is undoubtedly a conflict of interests.

But the leaders of the medical profession have not taken the myopic view. As a matter of fact they have been the very prophets and promoters of preventive medicine. The men who have done most to introduce the telescope have, with certain notable exceptions, been trained primarily to concentrate upon the microscope. With them cure and prevention have been not sharply contrasted but closely related ideas. They have increasingly regarded experience with disease in

individuals as a means of protecting the community against it.

The progress of public health depends upon the appreciation, sympathy, and support of the medical profession. Doctors will gradually come to think of themselves and to be regarded by the public as primarily responsible for keeping people well. Periodic physical examinations, the early discovery of incipient maladies, warnings against environmental dangers, the wise control of diet, insistence on appropriate exercise, suggestions about personal and social life, will in increasing measure replace medicines, hospitals, and sanatoria; may even reduce the demand for surgical service. Who knows but that the doctor of the future, receiving an annual retaining fee from his clients, will feel no embarrassment in taking the initiative and in keeping a watchful eye upon them? Then a case of illness would be not the physician's opportunity but a reflection upon his vigilance.

Progress in Prevention

Jenner's discovery of vaccination for smallpox, Pasteur's researches in the causation of various diseases by bacteria and microbes, the use of vaccines and sera, Lister's introduction of antiseptic surgery, are striking illustrations of the scientific knowledge of the origin, spread, and prevention of certain maladies which has been made available since the end of the eighteenth century, and especially during the last fifty years. Today hundreds of trained investigators in many countries are verifying, revising, and adding to this body of truth upon which all progress in preventive medicine depends.

The application of part of this knowledge by men of imagination and organizing ability has been a boon to mankind. The presence of smallpox is now a disgrace to any civilized community or country; cholera and plague have disappeared from the leading nations; typhoid fever has been enormously reduced; malaria and hookworm disease are giving ground; yellow fever is being narrowly restricted; typhus is practically unknown among a cleanly people; the fear of diphtheria has been largely allayed. Such victories as these, together with advances in general sanitation, higher living standards, more attention to individual health habits, have resulted in steadily falling death rates in all the more progressive countries.

But it is too early to feel complacent. Only a beginning has been made. Many diseases still baffle the health authorities. Whole regions have been almost untouched. Even the most advanced communities fall far short of what might be attained. The average individual re-

mains relatively ignorant and negligent of sanitary science and of personal hygiene. Almost all physicians are still too exclusively concerned with the individual aspect of disease.

Stages in the progress of preventive medicine are distinguishable. First comes control of the physical environment through pure water, milk, and food supplies, adequate sewerage and refuse disposal systems, improved housing, heating, and ventilation. Then follows control of diseases other than those whose causes are water and food borne. Various forms of occupational hazards and maladies are also attacked. Concern for the welfare of mother and child is a prominent feature at this stage. The third stage emphasizes the vital part which personal hygiene plays. It is roughly estimated that 80 per cent of the maladies which produce the total death rate cannot be directly controlled by the sanitarian. He must persuade individuals to conform to the laws of health and to report promptly the first sign that anything is amiss.

A fourth phase just beginning to emerge has to do with economic, social, and mental influences. Income, standard of living, opportunities for social intercourse and recreation, all have important relations to individual and community health. Mental hygiene, which is coming to be recognized as a part of public health, deals with problems of defects and delinquency in children and criminality in adults, with nervous and mental disorders, with the classification, treatment, and custodial care of the feeble-minded and insane, and related questions. To the support of the work of the National Committee for Mental Hygiene the Rockefeller Foundation contributed during 1921, \$86,370.57.

Changing Ideals of Health

Advances in the cure and prevention of disease reflect a shifting of emphasis and a gradual revision of the idea of health itself. Being "up and around" or "I can't complain" represents a far from stimulating conception of bodily prosperity, yet a "vertical rather than a horizontal position" is one criterion. Freedom from conscious pain would seem to be almost the obvious starting point for any useful standard of health, yet even this may be misleading. Conformity with objective norms such as average temperature, height, weight, blood pressure, condition of various organs, results of blood and other analyses, represents a more trustworthy basis of valuation. But after all these are at best negative or neutral ideals. There is a growing demand for a positive conception which in the individual registers itself in a keen sense of physical and mental vigor, a joy of living.

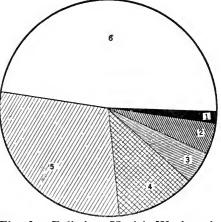
There is a tendency in certain quarters to extend the meaning of preventive medicine from merely negative measures to include more positive and constructive ideals of community or national health. Sanitation, control of contagion, protection against many other menaces, have become in advanced countries accepted procedures. Attention is now directed to more positive things, education of the public in personal hygiene, nutrition for young and old, physical exercise and mass athletics, provision for mental and emotional satisfactions through social and recreational activities.

On the other hand, probably the great majority of public health officers who are engaged in practical field work are rather dubious about giving, at least for some time to come, so broad a meaning to the idea of preventive medicine. They feel that so much remains to be done on the negative side that anything which may withdraw public attention from sanitation, control of contagious diseases, infant welfare, medical inspection of school children, and a somewhat narrower conception of personal hygiene, may for the present do harm rather than good. But this reluctance represents a demand for practical efficiency, not a failure to realize that with the progress of knowledge the idea of health is being reinterpreted in fuller and more positive terms.

The Demand for Trained Leadership

Even a hasty glance at the gains which have been made in safeguarding human lives makes one realize how much scientific knowledge, spe-

cialized skill, and organized capacity have been called into service. The expanding idea of health is adding new types of technically expert individuals to the health work. The list now includes: officers and chiefs who are in general charge, sanitary engineers, laboratory di-



personnel of Fig. 2.—Full-time Health Workers in health work. United States, 1921

		,	Number	Per cen
	1.	Officers of the United States Public Health Service	200	1.9
	2.	Principal executives em-		
		and counties	470	4.5
	3.	Subordinate executives	500	4.8
	4.	Laboratory workers, public		
		health laboratories	1,200	11.6
	5.	Plumbing, sanitary, dairy,	•	
		and food inspectors	3,000	28.9
•	6.	Public health nurses em-		
		ployed by public agencies	5,000	48.2

rectors who deal with bacteria, microbes, animal parasites, et cetera, and prepare vaccines and sera, specialists in statistics of births, sickness, and deaths, field experts in the control of epidemics,

administrators of clinics, hygienists for infants, medical inspectors of school children, mental hygienists and psychologists, leaders in health education for schools and the general public, visiting nurses, laboratory technicians, food and sanitary inspectors.

In the United States there are at present about 10,000 persons engaged in public health work under Federal, state, and municipal or county auspices. In Great Britain probably an equal number are giving all their time to the work of preventive medicine. The number in the service of non-governmental agencies of all kinds can scarcely be estimated but may represent nearly as many more. The self-governing Dominions employ a considerable number of professional sanitarians. In Continental Europe health organization has not as a rule reached so high a degree of development as in the British Isles. In many tropical countries, e.g., India, Java, the Philippines, both curative and preventive medicine are administered by corps of trained government officials. In all parts of the world there is an increasing demand for men and women competent to do different kinds of public health work. A forecast of the probable number needed during the next ten years in the United States calls for 20,000 persons.

Only in the last few years have opportunities

for special public health training been available in the United States. With exceptions almost negligible in number, American health

officers have had no other formal training than that of doctors of curative medicine. They have gained what special competence they may possess in the hard, wasteful, and onesided School of Experience. That a few have attained the level of "sanitary statesmen" is an evidence of

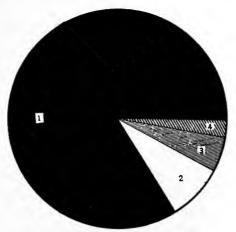


Fig. 3.—Professional Training of Health Officials

This chart is based on a study of the professional training of the responsible heads of health departments in seventy-two municipalities and forty-eight states. Less than 11 per cent of those filling these important positions have had special preparation for their work

		Number	Per cent
	Physicians without public health training	101	84.2
	Physicians with public health training	10	8.3
	Laymen without profes- sional training	6	5.0
4.	Engineers with public health training	3	2.5

exceptional ability and character, not a vindication of rule-of-thumb, trial-and-error methods. The future of preventive medicine depends upon drawing first-class men and women into the

profession and giving them efficient, modern, specialized training and supervised practical experience.

Handicaps to Recruiting

It is not to be denied that on the whole the best ability has been drafted into the service of curative rather than of preventive medicine. More than four hundred replies to questions recently put to students now enrolled in leading American medical schools disclose an attitude of ignorance, indifference, even antipathy with respect to a career in public health work. The reasons these young men give either for not considering at all or for deciding against such a life work are: (1) it is not a socially recognized, clearly professionalized calling; (2) there are no special schools for adequate training; (3) tenure and promotion depend not on merit but political "pull"; (4) salaries are meager; (5) the private practice of curative medicine is more reputable, independent, profitable, and satisfying.

These young men are in many respects uninformed and misinformed. Preventive medicine has already gained the status of a profession and is making rapid progress in public favor. At least two special schools of high rank are offering a thorough and appropriate training. An increasing number of important posts are freeing

themselves from the trammels of "spoils politics." The salary received by a health officer of full rank probably exceeds the income of the average private practitioner. Private practice has many disadvantages: excessive overtime and night work, poor collections, the necessity of dunning patients, little chance to study, constant economic pressure, a heavy burden of unpaid service, competition with quacks and charlatans, temptation to surrender scientific ideals. Public health service, on the other hand, is making a strong appeal to many men and women of imagination, courage, and social spirit just because it does not involve most of these things and offers many positive attractions.

Yet it must be admitted that the sceptical undergraduates are not wholly wrong. Public ignorance and indifference, invidious comparisons, lack of sound training in many officials, prejudice against law enforcement, delay the full appreciation of what preventive medicine means to society. The establishment of adequate schools has been a recent event. A few disheartening instances of political tampering with health departments have occurred of late. It is also true that the level of pay is far too low. Even the few highest salaries suffer painfully in comparison with the annual incomes of leading private consultants and surgeons. A greater

share of popular admiration, larger freedom from control, close personal relations with appreciative individuals, a deeper sense of professional pride, probably are still the portion of the practitioner of curative medicine. Persistent efforts, then, will be needed to make public health careers more attractive to the persons best fitted for successful work. Much can be done to enlighten and challenge medical students and young graduate doctors, but the problem calls for something far more fundamental than that.

The Responsibility of the Public

The cry is frequently heard that this governmental service or that "must be taken out of politics." In one sense this is absolutely essential to efficiency. A public function which calls for technical expertness is hopelessly handicapped if it be treated as the spoils of a political boss or of a victorious party machine. public service does this apply more strikingly than to a department of health. The moment efforts are made to influence appointments, promotions, salaries, policies, law enforcement, by political pressure for individual or party ends the demoralization of the work begins. The degree to which such things are possible is an index of the intelligence, spirit, and character of any community.

Yet in another, the original, meaning of politics public health ought to be always in politics. The safeguarding of the health of the people is a community task and responsibility. It is a proper and important subject for public attention and discussion. Officials are in duty bound to present their programs and budgets to boards, councils, and the public and to give convincing reasons for the measures and expenditures that are proposed. One of the essential qualifications of a successful health officer is the ability to explain his policies so as to win support for them. The hookworm campaigns of the International Health Board, for example, are always preceded by systematic education of the community in the cause, effects, cure, and prevention of the disease. Only when people understand the purpose and methods of public health measures can they be counted upon to co-operate willingly and effectively.

But obviously the busy health officer and his assistants cannot assume sole or even the chief responsibility for creating and maintaining the popular understanding and backing essential to the success of modern and progressive health policies. Elected officials, public-spirited private citizens, the schools, public and private, the press, chambers of commerce, women's clubs, social agencies, voluntary health associations are

the organs by which counties, towns, cities, and states should be kept constantly conscious of health measures until these have become a part of the accepted and well-administered routine of daily life. Then vigilance becomes the price of safeguarding what has been achieved and the means of supporting new plans for further advance. In the long run under representative government a community will get the kind of health administration that it deserves.

Until recently there has been little or no cooperation among the scores of voluntary health societies in the United States which are seeking to educate the public and to promote various health measures. The result has been a good deal of duplication, some working at cross purposes, a certain confusion in the public mind. It is encouraging to note that ten of the largest and most influential of these societies have formed a National Health Council, taken offices in the same building, and are working out plans for better team-work. During 1921 the Rockefeller Foundation contributed nearly twenty thousand dollars to the budget of this central bureau.

A West Point of Hygiene at Johns Hopkins

The International Health Board realized early in its history that a chief problem in disease prevention would be to find men qualified both scientifically and practically to do the work. An ordinary medical school education is not enough. There must be special training in the scientific principles, the administrative methods, and the point of view of preventive medicine and public health. So the Board decided to establish a school of health under the auspices of a university and in close relations with a modern medical school, but at the same time a separate institution with its own buildings and equipment, its own teaching staff, its own professional aims, its own esprit de corps. After a study of the various possibilities it was decided in 1916 to ask Johns Hopkins University to assume responsibility for establishing a School of Hygiene and Public Health for which the Rockefeller Foundation undertook to supply such sums as might be agreed upon as necessary for buildings, equipment, and annual maintenance.

In 1918 the new school, housed in temporary quarters, and equipped and manned, opened its doors. Courses of study leading to the degrees of Doctor of Public Health, Doctor of Science in Hygiene, Bachelor of Science in Hygiene, and to the Certificate in Public Health, were offered. Brief, intensive courses for active health officers were announced, and opportunities were promised to other types of special students. For the academic year 1920–1921 the faculty numbered

forty; 122 students were registered, of whom fifty-six were candidates for degrees or a certificate. The special six weeks' course for health officers enrolled twenty-nine students. The health departments of six states and of Costa Rica and Porto Rico were represented. A brief course for a group from the field staff of the International Health Board was also provided. In addition to the regular courses twenty-one public lectures on selected topics in hygiene and preventive medicine were given by prominent specialists.

The school has three leading aims: to provide a fundamental scientific training, to afford practical field experience under competent supervision, and to add to the knowledge of hygiene. The laboratory and lecture courses deal with: (1) the micro-organisms which are the inciting causes of disease, (2) the study of resistance and immunity, and the preparation of vaccines to protect against certain infections and of sera to mitigate their virulence, (3) the primitive animal parasites, for example, the blood parasite which causes malaria, the ameba of dysentery, (4) the parasitic worms of many kinds, of which the hookworm is the best known, (5) the insects by which diseases are communicated, such as the mosquitoes that spread malaria and yellow fever, (6) the collection, arrangement, and interpreta-



Fig. 4.—Students at work in the bacteriological laboratory of the School of Hygiene and Public Health of Johns Hopkins University



Fig. 5.—Class in protozoology, Johns Hopkins School of Hygiene and Public Health

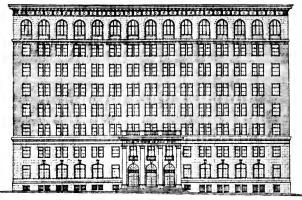


Fig. 6.—Architect's drawing of proposed new building to house the School of Hygiene and Public Health of Johns Hopkins University



Fig. 7.—The "Pay Clinic" of Cornell University Medical College. The picture shows the main entrance hall of the clinic, where new patients are admitted and directed to the various departments after the necessary general information has been secured, appointments made, and fees paid. Close co-operation of a group of specialists in all the leading branches of medicine makes possible careful diagnosis and thorough treatment at an expense which patients of moderate means can afford

tion of statistics about births, deaths, sickness, et cetera, (7) the methods of controlling infectious diseases, especially epidemics of various communicable diseases, (8) the problems of water supply, sewerage, disposal of refuse, housing, ventilation, (9) the functions of the human body in relation to health, (10) the chemical aspects of hygiene, (11) the significance, for preventive medicine, of mental and nervous diseases, delinquency, crime, feeble-mindedness, and insanity, (12) the principles of nutrition and diet, (13) the legal aspects of sanitation and hygiene, (14) the rules of health for the individual, (15) maternity and child hygiene, and (16) the organization and administration of public health work.

Actual experience in the field is gained by visits to various centers of sanitary and health activity and by volunteer service in the Baltimore Department of Health, or under the Maryland State Board, or in connection with the United States Public Health Service. Summer vacation employment with state or municipal health boards or other agencies provides valuable first-hand contact with problems of hygiene and administration. With increasing numbers of students, the difficulties of finding enough apprentice posts and of making sure of educative supervision will be serious. Plans are already under way to establish a special training area, a

field laboratory. Washington county, Maryland, with a population of 60,000 almost equally divided between city and country, has been selected for this purpose. The county health unit will include: a director, a sanitary inspector, a laboratory technician, a clerk, an attendant, and three nurses. A permanent headquarters, a laboratory, and motor cars will be provided. A sanitary and contagious disease survey will be made and an organization for dealing with the conditions will be created. This plan will furnish opportunities for training students and for testing methods. The project is jointly supported by the Maryland State Board of Health, local community and county organizations, the United States Public Health Service, the International Health Board, and the School of Hygiene and Public Health.

The investigative work of the School has covered a wide range of problems. A volume of scientific contributions made by members of the staff and published during the year contained fifty-five papers. The American Journal of Hygiene, of which several numbers have appeared, is published under the auspices of the School. It will confine its articles largely to results of research in the laboratory and the field. An active society of hygiene has been established. The chief field research activities of this period in-

clude: an investigation of the diphtheria situation in Baltimore, a special study in Trinidad of hookworm eggs and larvae in the soil, demonstrations in the feeding of undernourished children, a co-operative survey of health conditions among the school children of Baltimore. In the last investigations 6,000 children were weighed and measured; 1,500 were given medical examinations. The results showed that between 20 and 30 per cent of the children were 10 per cent or more under the normal weight for their ages. Much the same situation had been found in New York and other eastern cities of the United States.

For the current support of the School in 1921 the Foundation contributed \$250,000. It has also promised to give money for a new building and for additional equipment. This building, which will be close to the Medical School and Hospital, will contain laboratories, lecture rooms, a library, a museum, an auditorium, and will be provided with all the essential apparatus and other equipment for instruction and investigation.

Harvard Expands its Health Course into a School

Harvard was the second American university to establish a course in public health training. The University of Pennsylvania was the pioneer. By joining forces with the Massachusetts Institute of Technology, Harvard was able to offer a fairly well-rounded curriculum of fundamental studies in preventive medicine and sanitary engineering. Tropical medicine was also given an important position which has been well maintained. From the outset stress was laid upon work in the field. Every candidate for a degree was required to make a sanitary or health survey in a community near Boston. Fortunately a good many towns and smaller cities with creditable health departments were easily accessible. Graduates of the Harvard-Technology course gained useful practical experience. They were successful in securing posts in health departments and in other services.

More recently Harvard, through its medical school, took the lead in establishing courses of training in the field of industrial hygiene, which deals with the problems of fatigue, occupational disease, sanitation of mines and industrial plants, physical and medical examination and care for transportation, factory, and commercial workers, education in personal hygiene, mass athletics, recreation, et cetera. The co-operation and financial support of manufacturing and retail establishments in and near Boston were secured. A number of investigations were made to determine the causes and to discover ways of preventing or minimizing certain maladies which are traceable

to industrial processes. Students enjoyed opportunities for concrete experience in connection with the sanitation and hygienic administration of factories and large department stores. An important publication, *The Journal of Industrial Hygiene*, has been established under the auspices of this division of the Harvard Medical School.

Admirable as the work in public health training with its later emphasis on industrial hygiene was, the Harvard authorities were not satisfied. They felt the need of adding departments which were lacking-for example, public health administration and epidemiology and vital statistics—and of strengthening other courses which were undermanned, inadequately equipped, and too meagerly supported. There was a desire to reorganize and unify the whole undertaking into a separate school of health which should have its own headquarters and teaching staff. It was estimated that to accomplish this and to provide for future growth additional funds to the amount of \$3,000,000 would be required. Toward this the Rockefeller Foundation appropriated \$1,660,-000, and agreed if certain contingencies should arise during the next five years to supply \$500,000 more. The remainder of the total sum required was set aside or pledged by Harvard, and the organization of the new institution is well under way.

The Harvard School will be fortunate in having within easy access numerous urban and rural health departments, city and state laboratories, a large hospital for contagious diseases, industrial and other clinics, factory and store health systems, the port quarantine stations, the Carnegie Nutrition Laboratories, and many voluntary health associations with their clinics and nurses. All these institutions and agencies will afford most valuable experience for students and opportunities for fruitful investigations. While the Harvard School will include all the fundamental subjects it will not in every respect duplicate the work at Johns Hopkins. There will be differences in specialization and emphasis, so that the two institutions together will enrich and widen the field of investigation and extend the facilities for training. Advanced students may well study both in Boston and in Baltimore.

Health Training at Home and Abroad

New York University has recently completed a building a large part of which is to be rented as a branch laboratory of the New York State Department of Health. The University authorities were anxious to add to the building another floor which should house a clinic for the teaching of personal, infant, school, and industrial hygiene. The plan also included the remodeling and

equipping of a neighboring building as a museum to display models and other exhibits in sanitation, ventilation, industrial hygiene, and housing. For the carrying out of this project the Rockefeller Foundation contributed \$35,000.

One essential kind of training takes the form already mentioned of special intensive courses for persons who are actually engaged in health work. State departments of health and the United States Public Health Service are conducting institutes to meet this need. In several cases the Foundation through the International Health Board gave funds to supplement the appropriations of state boards of health for institute teaching. A small contribution was also made to a state department which is testing the possibilities of correspondence instruction for local health officers and their staffs.

The Pasteur Institute in Paris as a result of the war was seriously threatened not only with curtailment of its activities, but with a lack of new workers who should receive training, engage in research, and thus be prepared gradually to assume responsibility for the future of this world-famous center and its several branches. To supply fellowships for a transition period and to help defray the costs of training assistants the Foundation gave \$30,000 in 1921 and pledged other sums on a diminishing scale for the next two years.

The new Ministry of Health in Czechoslovakia early sought the co-operation of the International Health Board, which for two years has had a resident representative in Prague. Fellowships for health training in the United States were provided. An expert in public health laboratory organization was lent to the Government. Next a plan was elaborated for creating in Prague an institute of public health which should include central laboratories for diagnostic purposes, for producing vaccines and sera, and for aiding food inspection, together with a division for training health officers. A complete group of new buildings has been planned, to be erected on an easily accessible and ample site at a total cost for land and laboratories of about \$706,000, of which the Foundation has promised to supply \$378,000, or more than half.

During 1921 the International Health Board continued to contribute toward the maintenance of a department of hygiene in the medical school of São Paulo, Brazil. While a professor from the United States was in charge, young Brazilian hygienists who were trained in America on Foundation fellowships assumed increasing responsibility and proved themselves capable teachers and promising investigators.

From time to time during several years proposals have been made to establish in London a

central school of public health. In June, 1921, a Royal Commission recommended that such an institution be created, preferably in affiliation with the University of London. The possibilities of carrying out this recommendation were discussed by British officials with representatives of the Foundation and the International Health Board in London in the early summer. Later a request was made by the British Ministry of Health for the co-operation of the Foundation. This was considered by the Board and negotiations were authorized.

The Rôle of the Nurse in Cure and Prevention

The modern hospital and doctors and surgeons are largely dependent upon the trained woman nurse, who has made an invaluable contribution to curative medicine. Public health administrators are recognizing the visiting or health nurse as equally indispensable to the success of public and personal hygiene. Already maternity and child welfare nurses, school nurses, tuberculosis nurses, and several other specialized types have taken their places in private health systems and in government departments. One state has announced as its goal the appointment of a health nurse for every 2,000 of the population; another has fixed the ratio at one to 3,000.

Questions as to the exact function of the bed-

side nurse, the kind and length of training she should receive, have been under discussion for some time. The advent of the health nurse raises similar problems. How far should her education coincide with that of the hospital nurse? In what should consist her special training? How much time should the entire course occupy? Should there be different grades of both bedside and health nurses? Are there place and function for a lay worker or a healthvisitor? In 1919 the Foundation invited a group of persons who are most familiar with nursing problems to a conference which nominated a survey committee under whose auspices a competent expert has been making a study of the subject in all its phases. A report is promised in the summer of 1922. The expenses of the survey have been met by the Foundation.

During 1921 the International Health Board contributed toward short courses for New York State nurse training. Four nurse training centers in France were aided not only to train visiteuses d'hygiène but to improve in certain hospitals standards of ward nursing and administration. The Cavell-Depage Memorial School of Nursing in Brussels will be an integral part of the reorganized hospital and medical school to which the Foundation is contributing a large sum. The International Health Board is

co-operating with the government of Brazil in developing a public health nursing service. The Foundation supports a nurse training school in connection with the Peking Union Medical College. A survey of nurse training in Great Britain and on the Continent, to be begun early in 1922, has been authorized. Scholarships were granted to four Polish nurses for study and training in the United States.

Medical Service at Moderate Cost

A modern clinic may serve the interests of both preventive and curative medicine. Persons may resort to it to make sure that they are well or to have their diseases recognized and treated. Diagnostic and treatment facilities are now available in cities and large towns for the rich and well-to-do and for the very poor, but self-respecting people of small means are too often at a loss for good medical aid. It is true that the leading consultants and specialists make concessions in individual cases but this generous attitude of the profession solves only a minute part of the problem. The tendency to establish medical group clinics makes it easier to provide modern facilities at lower cost, but at best the fees are considerable, and many people hesitate to ask for a concession in charges. Hence the demand. for a pay clinic for persons with small incomes.

An experiment in meeting this demand was begun by the Cornell University Medical School in New York City in November, 1921, with the co-operation of a special committee of the United Hospital Fund. The work of this committee, which is helping to improve standards of dispensary management and service, is supported by the Rockefeller Foundation. The initial deficit of the Cornell clinic demonstration, which is expected to become self-supporting, was underwritten by this committee.

The essentials of the plan are: (1) medical, surgical, and specialist service by well-trained young doctors, who are paid for their work, (2) supervision by the college faculty, (3) instruction of medical students in the clinic, (4) appointments with patients made by telephone or post to avoid waste in waiting, (5) clinics, in addition to day sessions, open two evenings a week for the convenience of patients employed during the day, (6) a charge of \$1.00 for each call, laboratory examinations and X-ray plates at cost, a complete diagnostic examination for patients referred by physicians for an inclusive fee of \$10.00. On the day the clinic opened 700 persons presented themselves. There has been a steadily growing patronage ever since. An increasing number of doctors have brought patients for diagnosis and consultation. It is too early to assert that clinics of this kind will satisfactorily solve the problem, but experience so far has been distinctly significant and encouraging.

A Medical Center Opened in Peking

On September 19, 1921, in the capital of China a unique academic procession made its way through oriental corridors and courts to an assembly hall which in its exterior form and decorations reproduced the classic features of Chinese architecture. The cortège was a blending of East and West. Chinese officials and other leading citizens, some of them in national dress, members of the diplomatic corps, distinguished guests in the variegated brilliant gowns and hoods of European and American universities, the officers, trustees, and faculty of the Peking Union Medical College, all in academic garb, made a striking and symbolic picture. Brief words of greeting and appreciation from representatives of the President of China, the Cabinet, the medical profession and educational institutions, a statement by the Director of the China Medical Board, an address on the aims and spirit of the College by the Chairman of the Board of the Rockefeller Foundation, and the institution in its new setting and with enlarged resources was rededicated to the service of the Chinese people.

These simple ceremonies were one session of a

program which extended over an entire week and included daily clinics, scientific papers on medical and public health themes, popular evening addresses, sight-seeing excursions, a garden party at the Summer Palace, a reception by the President of China, dinners and receptions at the American and British legations. In addition to a score of special guests of the Foundation from England, France, Ireland, Canada, Japan, China, the Philippines, Hong Kong, and Java, more than three hundred medical and educational delegates, Chinese and foreign, were in attendance on what was actually an international congress of curative and preventive medicine. The clinics and papers were rated by competentjudges as highly scientific and significant. The contributions of the members of the Peking faculty made a most favorable impression upon the visiting scientists.

The buildings of the College were admired both for their architectural beauty and for their practical serviceability and complete equipment. All the essential laboratories and lecture rooms, a hospital of 225 teaching beds, and an outpatient department, are provided. The entire plant comprises for purposes of instruction, for faculty and student quarters, for mechanical services and storage, an area of about twenty-five acres and a total of fifty-nine buildings. It was neces-

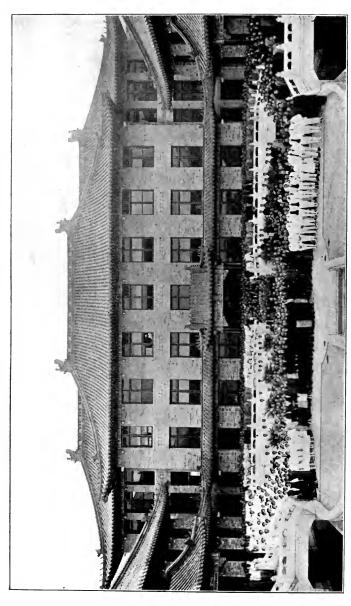


Fig. 8.—Staff and students of the Peking Union Medical College, September, 1921. Picture interns; to right on steps, students; in background, laboratory assistants, hospital attendants, taken in the forecourt of hospital. Left to right: nurses, administrative staff, faculty and hospital service workers, janitors, cleaners, cooks, laundrymen, gate-keepers, guards, and servants



Fig. 9.—Academic procession at dedication of the Peking Union Medical College



Fig. 10.—Part of academic procession, dedication of Peking Union Medical College, September 19, 1921. From right to left: Dr. W. W. Yen, Minister of Foreign Affairs; Mr. Roger S. Greene, Director of the China Medical Board; Dr. H. S. Houghton, Director of the Peking Union Medical College; Mr. John D. Rockefeller, Jr., Chairman of the Board of Trustees of the Rockefeller Foundation

sary not only to build a medical school and hospital but to add to them the housing, water supply, sewerage, electric light, and fuel gas services of a modern community. The cost of construction was enormously increased by the war. Prices soared, freight rates rose, silver so increased in value that at one time a gold dollar would purchase slightly less than one silver dollar instead of the normal two.

On June 30, 1921, the teaching staff of this Peking center numbered sixty-seven, of whom seventeen were instructors in the pre-medical school. About one fourth of the total teaching corps were Chinese, almost all of whom were trained in the United States or Europe. Besides the educational personnel there were fifteen hospital interns and residents, twenty-eight nurses, twenty-nine members of the business and administrative departments, twenty-two secretaries, eleven technicians, librarians, and others. The service group of assistants, attendants, messengers, cooks, waiters, stokers, janitors, totaled 601, practically all Chinese. The student registration for 1921-1922 showed fifty-two in the pre-medical school, twenty in the medical school, and eleven in the nurses training school. For the previous year forty-nine advanced students were registered for graduate and special courses. This number is likely to be exceeded

during the current session. The total number of students for the year will approximate 140. The fact that only a small number of preparatory schools and colleges can meet the entrance standard, the length and cost of the medical course, the popular ignorance of modern medicine, are obstacles to be slowly overcome. In all the circumstances the present numbers are distinctly encouraging.

The College seeks quality rather than quantity. It aims not to turn out numerous doctors -Chinese institutions must assume this taskbut to train leaders who may serve as teachers and investigators in Chinese medical schools, hospitals, and health organizations. In its own work it proposes to develop Chinese teachers, who already constitute 25 per cent of the teaching staff, and to give them increasing rank and responsibility as rapidly as they are prepared to assume them. The officially announced purposes of the Peking Union Medical College are: to conduct a high-grade medical curriculum for undergraduates, to provide graduate training for laboratory workers, teachers, and clinical specialists, to offer short courses for physicians, to furnish opportunities for research, especially in diseases peculiar to the Far East, and incidentally to extend the popular knowledge of modern medicine and public health among the Chinese.

The trustees devoted a week in Peking to detailed consideration of the problems of the College and adopted a policy which calls for: (1) gradual growth rather than rapid expansion, within (2) budget limits fixed for three years at not more than \$1,200,000 silver (about \$700,000 gold), per annum, (3) the gradual transfer of the responsibility for pre-medical education to other schools and colleges, (4) the training of Chinese men and women to assume, as fast as they show the necessary capacity, increasing responsibility for teaching, investigation, and administration, (5) the encouraging of Chinese co-operation in the increasing of clinical facilities by establishing under Chinese auspices special dispensaries and hospitals, (6) a steady effort to enlist the interest and secure the aid of public-spirited Chinese in interpreting the purposes of the college to the Chinese people.

In addition to their regular duties members of the faculty of the College during the year participated in famine relief, worked out a food ration as a basis for distribution of food to famine sufferers, provided medical consultation service for a Chinese orphanage, visited many educational institutions to give expert counsel about apparatus and X-ray equipment, organized typhusprevention squads to protect the refugee camps and the city of Peking, rendered a large amount

of private medical and surgical service the fees for which went into the treasury of the College, assisted in archeological research, and in many other ways entered into the life of the capital and the country.

The China Medical Board, under whose auspices work in China is administered, in addition to completing and maintaining the College in Peking, authorized a survey of pre-medical education, contributed to the expenses of a commission sent by a group of missionary societies to study and report upon education under missionary auspices in China, made appropriations to a language school and a school for foreign children in Peking, contributed to a dental clinic in return for service to the college hospital, gave maintenance funds to two mission medical schools, made a small gift to a Chinese medical school, continued appropriations which had been pledged to five pre-medical schools, seventeen hospitals, and to a committee for translating medical books into Chinese, and awarded fellowships for study in the United States.

Medical Education in Many Lands

Columbia University in behalf of its medical school has made an arrangement with the Presbyterian Hospital by which on a new uptown site in New York a combined medical school and hospital group will be built. This will be one of the most complete and best equipped medical centers in the world. Toward the sum needed for building operations and increased maintenance the Foundation agreed to contribute \$1,000,000.

During 1921 contracts were signed with the University of Brussels, the Hospital Board of Brussels, and the municipality itself, by which the Rockefeller Foundation agreed to give \$3,500,000 toward the cost of concentrating upon one site and completely rebuilding the medical laboratories and the antiquated hospital of St. Pierre. The Cavell-Depage Memorial Nurses' Home and Training School will be an integral part of the project. The new buildings designed by a leading Belgian architect will constitute the most modern and convenient medical training plant in Europe.

In further distribution of the \$5,000,000 set aside in 1920 to aid medical education in Canada the following sums were voted during 1921: to Dalhousie University to meet an emergency which arose in connection with a maternity hospital, \$50,000; to the University of Montreal medical school for strengthening pre-medical science teaching, \$25,000; to the University of Alberta for clinical instruction, \$25,000. The pledge of \$1,000,000 to McGill University was paid.

During the year the Foundation supplied the funds by which thirty-eight medical centers in Central, Western, and Southern Europe received current numbers and back files of the principal journals of the medical sciences published in English. Without this aid it would have been impossible in view of present rates of exchange for these institutions to secure any considerable number of these important publications. In addition to the \$100,000 voted in 1920 for apparatus and supplies sorely needed by five universities in Central Europe, an additional sum of \$50,000 was last year appropriated for the same purpose.

With the aim of gathering accurate data about medical education in many countries, representatives of the Foundation made surveys of medical schools in Japan, China, Hong Kong, the Philippines, Siam, Indo-China, Straits Settlements, Java, Egypt, Syria, and Constantinople. Less thorough studies were made of several schools in India.

Envoys of Science and Education

Bacon in the *New Atlantis* describes an ideal commonwealth based upon scientific research and the application of its results to the life of the people. One of the officials in explaining the organization of the staff to foreign visitors, says: "For the several employments and offices

of our fellows, we have twelve that sail into foreign countries . . . who bring us the books and abstracts, and patterns of experiments of all other parts. These we call merchants of light." Bacon saw that science suffers not only from provincialism but from nationalism. The search for truth and its application to human need is a vast, world-wide co-operative task which demands constant interchange of ideas and more intelligent team-work among workers. Every country should seek entangling alliances in a league for scientific progress.

During 1921 the Foundation made a contribution to world commerce in ideas. Its own representatives visited Europe, the Near East, the Far East, India, and South and Central America. Resident directors of health demonstrations were maintained in twenty-three foreign countries. From all these men and women came reports, memoranda, and printed matter which enriched the files of the central office and supplied ideas and suggestions, many of which will be at the disposal of individuals and institutions in this and other countries.

At the invitation of the Foundation individuals and groups visited the United States and Great Britain as envoys of science, "merchants of light." Two heads of departments in University College Hospital Medical School, London, made

a tour of the leading medical schools of the United States and Canada. The executive secretary of the Medical Research Council and the chairman of the Medical Division of the University Grants Committee of Great Britain followed much the same itinerary. The president of the hospital board of Brussels and the architect of the new medical buildings visited England and the United States to study the architecture and administration of hospitals and laboratories. Clinical professors of the Brussels University Medical School spent some time in London to observe the operation of full-time units in medicine and surgery and the use of outpatient departments in teaching. A Serbian Commission visited the United States and England to familiarize its members with methods of medical education and of public health administration. A noted Brazilian physician, the Director of the National Department of Health and of the Oswaldo Cruz Institute, came with one of his colleagues to visit medical schools and to study public health laboratories and practical field methods.

Student Fellows from Eighteen Countries

One hundred and fifty-seven individuals during 1921 held fellowships, funds for which were directly or indirectly supplied by the Rockefeller Foundation. These fellowships fell into five groups: (1) fifty-four fellowships in public health under the International Health Board, (2) fifty-two fellowships administered by the China Medical Board, (3) sixteen fellowships in medical education, (4) thirty-four research fellowships in physics and chemistry supervised by a special committee of the National Research Council, and (5) one member of the International Health Board staff who, on what is known as "study leave," was engaged in special study. The distribution of these fellows by countries was: seventy-one Americans, one Belgian, seven Brazilians, eleven Canadians, one Singhalese, seventeen Chinese, one Colombian, two Costa Ricans, nineteen Czechs, seven British, four French, one Guatemalan, one Mexican, two Nicaraguans, seven Poles, two Salvadoreans, two Syrians, one Norwegian.

The increase in the number of Foundation fellowships during the last few years is significant. In 1917 there were sixty-one; by 1919 the list included eighty-four; in 1920 there were 120; the maximum for 1921, as has been already indicated, was 157. This rapid multiplication of fellowships reflects the conviction that the training of men and women for leadership and for technical efficiency is fundamental to progress in preventive medicine and in medical education. Fellow-

ships are granted only to persons of exceptional promise who declare their intention of entering institutional or governmental service. Explicit official assurances that posts will be available when the training has been completed are also required. The plan is beginning to show encouraging results. Already a number of former fellows are occupying positions of responsibility in their own countries.

The fellowships, which are administered directly by the Foundation and its agencies, are supervised by a special officer who gives most of his time to corresponding with candidates, conferring with newly arrived fellows, advising them about institutions and professors, helping them to arrange their plans of study, visiting them from time to time in the cities where they are at work, conferring with the men under whom they are studying, securing periodic reports of progress, dealing with emergencies, arranging for special excursions, and in other ways seeking to insure the most fruitful use of the opportunities which the fellowships are designed to provide.

Yellow Fever in Retreat

The salient facts about yellow fever may be summarized as follows: probably prevalent in Aztec times in Mexico and Central America; for last two centuries a dreaded scourge in Mexico, the West Indies, Central and South America, frequently invading North American ports and causing thousands of deaths in the lower Mississippi valley; fact of transmission by bite of female Stegomyia mosquito established by American Army Medical Commission under Reed in Cuba, 1900-1901: Havana and Cuba freed from fever by Gorgas, who organized anti-mosquito measures, 1901-1902; example followed in Rio de Janeiro and Vera Cruz, 1903-1909; Panama Canal Zone successfully protected by same methods, 1904-1906; fear that canal traffic might carry disease to Far East and the confidence of Gorgas that fever could be eliminated led to appointment in 1916 by International Health Board of special commission to survey seed-beds of infection; Gorgas, head of commission, recommended a campaign of extermination; during delay caused by war, Noguchi of Rockefeller Institute for Medical Research visited Ecuador, Peru, and Yucatan, isolated germ believed to be inciting cause of yellow fever, and prepared vaccine and serum, 1918-1920; yellow fever commissions organized in Central American countries, Colombia, Venezuela, Ecuador, and Peru; intensive campaign, 1918-1919, under Connor eliminated disease from Guayaquil, the chief endemic center; 1920, commission sent to West Coast of Africa to investigate suspected areas; with oc

casional outbreaks, most of them traceable to places in Southern Mexico, the fever gradually gave ground; late in 1920 Mexican government organized commission and invited co-operation of International Health Board.

Up to the beginning of 1921 experience with Noguchi's vaccine and serum indicated that the former when properly administered affords a marked protection against attacks of yellow fever, and that the latter if it is used on or before the third day of the onset of the disease reduces the mortality in a striking way. Data reported during last year confirm these conclusions. In Peru, of a group of fifty non-immune soldiers who were being sent into an infected district, twenty-five were vaccinated and twenty-five were left unvaccinated. Twenty of the latter group contracted yellow fever, while no case of the disease occurred among members of the former. Of twelve yellow fever patients in Belize, Honduras, who were treated with serum on or before the third day of the attack, eleven recovered. Until yellow fever is eradicated at its sources, the vaccine and serum promise to be most valuable means of prevention and cure.

With the entrance of the Mexican government early in 1921 into the yellow fever campaign the prospects of successful advance brightened. The chief remaining sources of infection were at-

tacked. During 1921 Ecuador, Honduras, Nicaragua, and Costa Rica were not invaded by the disease. Guatemala reported no case after February 2; Salvador's last case was recorded February 15; by July 16 Peru was free, as was British Honduras in November. From Northern Brazil cases were reported but the situation was being dealt with by the government. It was gratifying to the Foundation to be able to advance money for continuing the campaign in Peru at a time when government funds were not quickly available. The advantages of having resources which could be immediately mobilized in an emergency were strikingly demonstrated. It was another example of the efficiency of a unified plan of co-operation. The outlook is encouraging; it is too early to proclaim a complete victory, but the purpose to push the fight against yellow fever remains steadfast.

Howard B. Cross on the Honor Roll of Science

Dr. Jesse Lazear, one of the Army commission in Cuba, gave his life for science and his fellow men as the direct result of his studies of yellow fever. Such courage knows no stimulus of dramatic excitement, of martial music, of stirring battle charge. The list headed by Lazear, of brave men and women who have died in investigating yellow fever or in car-

ing for its victims, is a long and noble roll of honor.

To this roll has been added during recent months the name of Howard B. Cross, of the staff of the Rockefeller Institute for Medical Research, who, after special work with Noguchi, went to Mexico under the auspices of the International Health Board to assist in the diagnosis of doubtful and complicated cases of genuine or suspected yellow fever. He sailed from New York November 23, landed at Vera Cruz, fell ill in the village of Tuxtepec December 18, and returned to Vera Cruz, where he died of yellow fever December 26, 1921.

The Mexican authorities and the Mexican medical profession did all in their power to show their sympathy and admiration. The utmost courtesy and consideration were manifested. By formal resolutions, guards of honor, and other evidences of respect and appreciation, their good will and gratitude were warmly expressed. The public health laboratory of Vera Cruz has been named the Howard B. Cross Laboratory.

Dr. Cross, born in 1888, was graduated from the University of Oklahoma, served as instructor in zoology for two years, was a graduate student at the University of Chicago and at Johns Hopkins University. In 1917 he married Miss Ollie DeBoard. In June, 1921, he received the degree of Doctor of Philosophy from the latter institution, where he had specialized in bacteriology. In 1918 Dr. Cross had enlisted in the United States Army Medical Corps and was assigned to the Johns Hopkins Medical School for special investigative work.

This young American, well-trained, devoted to the search for truth, loyal to a great cause, died gallantly in combating a dread plague. By his death science has lost an able and conscientious worker, and the world a brave and generous spirit.

Continued Demonstrations in the Control of Malaria

The primary object of the International Health Board and the allied Federal and state health organizations in undertaking malaria work in 1916 was to prove to small towns, villages, and rural communities that malaria can be practically eradicated at per capita costs which make elimination cheaper than harboring the disease. The campaigns were based upon two scientific facts: (a) malaria can be communicated only by the bite of the Anopheles mosquito, and (b) almost all sufferers from malaria can be cured by the administration of quinine in proper doses over a sufficient period of time. The prevention of mosquito breeding by drainage, by

surface oiling of standing water, by the use of fish which eat the mosquito larvae; the protection of people by screening beds and houses, by removal of houses from the vicinity of breeding places, by the killing of adult mosquitoes; the use of quinine when mosquito control is too difficult, have been tried in various combinations, most-

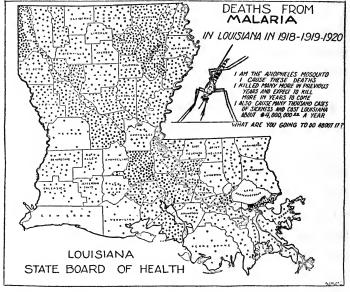


Fig. 11.—Map used in anti-malaria campaign in Louisiana. Each dot represents a death from malaria. The public health importance of malaria, however, is more accurately measured by the sickness rate and the loss of efficiency than by the loss of life. It has been estimated that for each death 2,000 to 4,000 days of sickness must be included in the total burden of loss and suffering caused by the malaria mosquito

of them with a success that has been strikingly convincing.

For the past two years demonstrations have been carried on in conjunction with local authorities, state boards of health, and the United States Public Health Service. During 1921 in nine southern states new demonstrations were undertaken in twenty-six localities, while supervision of work previously inaugurated was continued in thirty-five places in ten states. Reports indicate that substantial reductions in the prevalence of the disease were effected at an average per capita cost of \$1.01. Reductions secured by demonstrations made in 1920 were maintained at an average cost of \$.25 per capita.

Investigations as to the adaptation of antimalaria measures to tropical conditions were started in Porto Rico and Nicaragua. Preliminary studies were also made in Argentina and elsewhere to discover variations in conditions to be dealt with. Experiments in treatment by quinine were concluded in Sunflower county, Mississippi, where by experimental methods a standard dose of this drug calculated to protect individuals had previously been worked out and has now been made available to the public through commercial channels at a cost of \$1.95.

In addition to continued investigations in various methods of mosquito control, including the

use of fish, surveys were undertaken in two regions in the South to determine the prevalence of malaria and the part which it plays in impairing the health and efficiency of a given population. One report for an area in Southeast Missouri was completed and confirms the belief held by many that this disease, although less severe than in former years, is still a crippling malady which not only impairs vitality, increases suffering, depresses the community spirit, but adds directly and substantially to the death rate.

The Hookworm Story of One County

In the spring of 1910 a hookworm survey was made of the school children of a Virginia county. This study showed that 82.6 per cent of the pupils were infected, and there was reason to believe that a high percentage prevailed in the population as a whole. There were plenty of external evidences of the malady. Individuals were pale, listless, and weak. Many were bed-ridden. The rich soil ill-cultivated produced a bare living. School attendance was small and the children who were enrolled made little progress. Local institutions languished; social life was primitive, community spirit lacking, moral standards low. The people were carrying a crippling load. Greedy parasites were robbing their blood. A polluted soil was maintaining the vicious circle of infection.

The Rockefeller Sanitary Commission, later merged in the International Health Board, began at once in co-operation with the Virginia State Board of Health an anti-hookworm campaign under the leadership of a devoted and able local physician whom the people knew and trusted. Clinics were organized, the cause, cure, and prevention of hookworm disease were explained to the public, curative drugs were administered, sanitary conveniences were introduced. Fifteen months later a second school survey showed that the infection had been reduced to 35.2 per cent. The changes in the life of the community were unmistakable. The glow of health had come to once pallid faces, chronic invalids had returned to active work, farms gave larger returns, the school enrolment had increased, pupils were alert, new energy and spirit manifested themselves in neighborly contacts and co-operation. But the work was not abandoned. Vigilance was continued and to good purpose, for a third survey made in 1921 showed the almost negligible infection of 2.2 per cent. In a little more than a decade a radical transformation had occurred.

Resurveys of many other counties scattered through the Southern States were made during 1921. The results were gratifying and encouraging. They showed what can be accomplished by

persistent attacks upon one widely prevalent disease. They will spur the health authorities to renewed effort on a broader scale. Aid in the control of hookworm disease was given by the International Health Board to governments in eighteen different countries in South and Central America, the West Indies, India, Ceylon, Borneo, Siam, and Australia. In almost every case the authorities assumed during the year a larger share of the cost. Investigations were also continued into the nature and spread of hookworm disease.

Hookworm Broadens into Health Service

The process of widening hookworm work into general county health services made rapid progress during 1921. The International Health Board in ending its specific campaign participated in the broader programs which were carried out in eleven southern states. Before the end of the year arrangements had been made to aid similar undertakings in seven other states. Last year 192 counties in the United States were conducting health services under full-time health officers. To the health budgets of seventy-seven of these counties the Board contributed on the average one fourth of the cost. The development of county health work in Brazil is a gratifying outgrowth of the hookworm campaign in which the

International Health Board had been participating.

County health measures obviously vary with the local conditions. Attacks must be made upon diseases in the order of their importance. Costs must be kept within the limits of the funds available. In the circumstances the plans are necessarily fairly simple and inexpensive. The average campaign includes: vaccination against typhoid and smallpox; diphtheria prevention; the building of sanitary fly-proof latrines; medical inspection of school children, with dental and tonsil clinics; infant and maternal welfare work; control of communicable diseases in general, including special attention to tuberculosis, and popular education in public and personal hygiene.

The following is an estimate of the annual cost of a full-time health administration in an average county: salaries—county health officer \$3,000, sanitary inspector \$1,500, nurse \$1,500, clerical assistant \$900; traveling expenses for these persons \$2,400; contingent fund \$700; total \$10,000. While contributions from outside sources seem to be necessary at the outset it is believed that fairly prosperous counties should be able to meet by taxation the entire cost of this simpler type of health service. An extension of the program might call for continued state and Federal aid to supplement local funds.

Tuberculosis Campaign in French Hands

The special Commission which in 1917 was sent to France under the auspices of the International Health Board to aid in the creation of a nation-wide anti-tuberculosis organization was formally disbanded June 30, 1921. Certain special representatives of the Board remained in France to complete arrangements for the final transfer to French agencies, governmental and private, of the functions which the Commission had been performing. These activities were of four kinds: (1) medical, including demonstration dispensaries and graduate courses for physicians, (2) training of public health visitors, (3) education of the public, (4) organization of departmental and local committees.

Systems of tuberculosis clinics established by the Commission in the nineteenth arrondissement of Paris and in the department of Eure-et-Loir have been transferred, together with certain sums of money, to the municipal and departmental authorities. The number of dispensaries established throughout France since July, 1917, and modeled upon these demonstration centers, has reached a total of 373, a substantial proportion of the total number estimated as necessary to give the nation an adequate system upon which to base an inclusive program of early

diagnosis, health visitors, preventoria, sanatoria, special relief, and individual and public education.

From training schools aided by Foundation funds, 249 health visitors have been graduated. Some of these women are serving as departmental supervisors; others are working in local dispensaries. The length of the training course has been extended from six to ten months. Some schools are now requiring two years. Scholarships both for physicians and nurses in training have been provided by the Board in large numbers. Salaries for supervising and other visitors have also been paid from the same source. Responsibility for these forms of aid is being transferred steadily to the French.

Active educational propaganda by means of traveling exhibits, school exercises, public meetings, groups of lecturers, films and stereopticon slides, posters, pamphlets, newspaper articles, et cetera, has been carried on in fifty-four of the ninety-three departments of France. Motor cars, and more recently a special railway carriage, have been utilized. This function is being gradually handed over to the Comité National, a French society for combating tuberculosis. It is proposed to create under the auspices of the Comité a bureau by which literature will be issued for distribution through departmental and local

committees. For a time the Board will continue to support two traveling educational units.

As a result of initiative of the Foundation's Commission eighty-eight departmental committees and over 350 local committees have been formed. It is these groups which help to organize and support dispensaries and to promote other features of the plan. While the Board will not extend this organization work to other departments, it will in certain places give counsel and aid, seeking to improve organizations and to secure appropriations from departmental and city treasuries. This task of organization is being assumed more and more by the Comité National, to which, next to the Ministry of Hygiene, the Board looks for the continuation and extension of the anti-tuberculosis movement in France.

This project represents the only effort of the International Health Board in the field of tuberculosis. It was undertaken as a form of war-time, emergency aid. There is no intention of doing similar work in other countries. The Board had no thought of providing a complete system for combating the white plague. It did not assume responsibility for hospitals, sanatoria, or direct relief. The American Red Cross during the war made generous appropriations for these purposes. The aim of the International Health Board was to demonstrate a system of organiza-

tion, of special training, of popular education, of extension methods. It hoped to stimulate government and voluntary agencies to adopt this system on a national scale and to support it as adequately as circumstances would permit. Everything considered, the response of the French people has been remarkably gratifying. Up to the end of 1921 the Board had spent upon this French campaign about two million dollars.

Consultation Service and Field Studies

During the year 1921 officers and special representatives of the Rockefeller Foundation and its agencies gave counsel to twelve state and national governments about health laboratory administration, made recommendations to medical school authorities in the Far East, conferred with officials of the British government concerning the problem of training health officers, lent a public health administrator, a sanitary engineer, and an industrial hygienist to the Australian Ministry of Health, contributed toward the salary and supplies of a pathologist in the São Paulo Medical School, Brazil, and in other ways made information and suggestions available for public authorities, educational institutions, and voluntary health agencies.

In addition to the scientific investigations of hookworm disease, malaria, and yellow fever which have already been mentioned, the Foundation supported studies of pre-medical education in China, of nurse training, of dispensary development, of hospital administration, and the training of hospital executives. Surveys were also made of leading medical schools and hospitals in Japan, Manchuria, China from Peking to Hong Kong and from Shanghai to Changsha, the Philippines, Straits Settlements, Siam, and Indo-China. In connection with public health inquiries a representative of the International Health Board visited medical schools in Constantinople, Beirut, Cairo, Bombay, and Calcutta.

In the routine investigation of projects which ask for Foundation aid a large amount of valuable data is accumulated in the office files and library. This material forms a growing body of significant information about various movements and institutions most of which are more or less closely related to public health and medical education. For example, during 1921 a special visit was made to the Marine Biological Laboratory at Woods Hole, Massachusetts, upon the organization and work of which a report was prepared.

Sundry Items of Aid and Service

For twenty years, under the name of the Concilium Bibliographicum, the late Dr. Herbert

Haviland Field maintained in Zürich, Switzerland, a bureau of bibliography which provided printed library cards and bound volumes of references in certain of the biological and medical sciences. During the war this institution was so seriously crippled that its continuance seemed impossible. Pending a study of the problem of international bibliographical service, the Foundation gave temporary aid. During the year 1921 the National Research Council of the United States made an investigation and decided in conjunction with a Swiss society to assume responsibility for the Concilium. Toward capital costs and for a three-year period of maintenance a further contribution was made by the Foundation.

A council of associations which are interested in hospital development has established in Chicago a hospital library and service bureau. This collects all kinds of significant information about hospital planning, equipment, personnel, and administration. This clearing house furnishes to boards of trustees, executives, and others, authoritative reports on various phases of the hospital problem. While attention has at first been centered on the situation in the United States, the scope of the work is being gradually extended to include other countries. The Foundation has contributed to the maintenance of this bureau.

The American Medical Association prints a Spanish edition of the Journal of the American Medical Association which circulates in Mexico, Central and South America, Spain, and the Philippine Islands. This edition so obviously contributes to a wider knowledge of modern medicine and to a better understanding between the United States and Spanish-speaking nations that the Foundation has been ready to share with the Association the burden of the deficit which is involved in its publication.

In answering the large number of letters from correspondents the officers of the Foundation and its Boards try so far as feasible to supply useful information and to offer practical suggestions. It is often possible in this way to render service even when, as is so generally the case, no financial aid can be given.

Applications for Aid

Table 1, covering the requests for aid made during the year 1921, shows that 721 formal applications were dealt with by the Foundation. There were, besides, a large number of tentative inquiries which never reached the stage of official requests. The statistics reflect the policy of concentration, for the present at least, upon fundamental projects of medical education and public health.

TABLE 1: APPLICATIONS FOR AID RECEIVED AND ACTED UPON DURING 1921

CLASSIFICATION OF APPLICATION	RECEIVED	GRANTED	DECLINED	PENDING
Public Health Medical and nursing education and subsidization of medical research (including granted fel-	56	7	49	
lowships)	132	41	86	5
other than medical) 4. Foreign relief or recon-	71	3	67	1
struction 5. National movements in	21		21	
fields other than 1 and 2	8		8	
6. Campaigns to influence public opinion	16		16	
7. Local churches and institutions	163		163	
loans, gifts, medical treatment, education). 9. Financing or promotion	128		128	
of books, plays, inventions, etc	37		36	1
purchase of alleged medical discoveries 11. Miscellaneous	51 38	1	51 37	
Total	721	52	662	7

Finances for 1921

Table 2 gives a summary of receipts and expenditures for the year 1921.

The income from invested funds was nearly eight millions and three quarters. A balance of six millions was carried over from 1920, of which four millions had been pledged. Likewise a balance of seven and a third millions was carried forward into 1922, of which six and a quarter

millions had been pledged. Tables on pages 82 and 83 present a summary of expenditures in 1921 for all purposes. The total outstanding obligations of the Foundation, December 31, 1921, including appropriations already due, and appropriations and pledges payable in 1922 and future years, were \$23,219,394. The aggregate expenditures of the Rockefeller Foundation from the time it was chartered in 1913 up to December 31, 1921, were \$61,081,775. Thus, during its existence the institution has disbursed, appropriated, or pledged a total sum of \$84,301,169.

TABLE 2: RECEIPTS AND DISBURSEMENTS IN 1921

RECEIPTS		EXPENDITURES	
Balance from 1920 Refunds on appropriations Income during 1921	\$6,204,316 82,353 8,702,690	Public Health Medical Education . Food Relief— Europe	\$2,123,820 4,111,667 1,000,000
		Miscellaneous Administration	224,748 170,123
		Balance	\$7,630,358
		Payable on 1921 and prior year appro- priations \$4,032,998 Available for 1922 appropriations	
		3,326,003	7,359,001
	\$14,989,359		\$14,989,359

Team-Work for World Health

The outlines of a world-wide campaign for health are beginning to emerge. Scientific research workers in many national centers are in

constant communication. Knowledge is being applied more effectively to the problems in the field. Governments are sending attachés of hygiene into each other's territories. Vital statistics on an international scale are being reported more accurately. Prompt notification of epidemics is being facilitated. Outposts against plague and other diseases are being stationed and supported. Leaders and technical experts are in training in larger numbers and under more favorable conditions. Fundamental medical education is becoming more thorough and more cosmopolitan. Popular knowledge about preventive medicine and personal hygiene is increasing. Intercommunications of many kinds are being improved and multiplied. All these things are fostered by many methods and agencies such as working agreements between governments, the Health Committee of the League of Nations, and the League of Red Cross Societies. It is the purpose of the Rockefeller Foundation and its Boards to have a part in this world-wide team-work for preventing disease and bringing about improved conditions of health, and thus "to promote the well-being of mankind throughout the world."

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THE ROCKEFELLER FOUNDATION Report of the Secretary

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To the President of the Rockefeller Foundation: Sir:

I have the honor to submit herewith my report on the activities of the Rockefeller Foundation for the period January 1, 1921, to December 31, 1921.

Respectfully yours, EDWIN R. EMBREE, Secretary.

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SECRETARY'S REPORT

The review by the President outlines the policies by which the Rockefeller Foundation is being guided in its work, sketches its present program, and describes the results aimed at and accomplished during the year 1921. The following report depicts the organization and the agencies through which these results were reached, and outlines the methods by which the programs of the several departments were carried out.

Organization

The following are the members and officers of the Rockefeller Foundation for 1922:

MEMBERS

John G. Agar Vernon Kellogg Wallace Buttrick John D. Rockefeller John W. Davis John D. Rockefeller, Jr. Simon Flexner Wickliffe Rose Raymond B. Fosdick Iulius Rosenwald Frederick T. Gates Martin A. Ryerson A. Barton Hepburn¹ Frederick Strauss Harry Pratt Judson George E. Vincent

EXECUTIVE COMMITTEE

George E. Vincent, Chairman
Wallace Buttrick Vernon Kellogg
Raymond B. Fosdick Wickliffe Rose
Edwin R. Embree, Secretary

¹ Deceased.

OFFICERS

John D. Rockefeller, Jr. Chairman Board of Trustees George E. Vincent President Edwin R. Embree Secretary Norma F. Stoughton Assistant Secretary L. G. Myers Treasurer L. M. Dashiell Assistant Treasurer Robert H. Kirk Comptroller Chase Andrews Assistant Comptroller Frank S. Staley Office Manager C. C. Williamson Director of Information

Service

The Foundation holds regular meetings in February, May, and December. The executive committee meets frequently during the intervals to execute programs within general policies approved by the Trustees. Twenty-two meetings of the Executive Committee were held during 1921.

Departmental Agencies

The Foundation accomplishes its work largely through departmental organizations that are devoted to special functions, and depend upon the Foundation for funds. These with their officers and members are:

INTERNATIONAL HEALTH BOARD

George E. Vincent, Chairman

Hermann M. Biggs
Wallace Buttrick
Simon Flexner
Raymond B. Fosdick
Frederick T. Gates
Edwin O. Jordan
Wernon Kellogg
T. Mitchell Prudden
John D. Rockefeller, Jr.
Wickliffe Rose
Victor C. Vaughan
William H. Welch

Edwin R. Embree, Secretary Florence M. Read, Assistant Secretary Wickliffe Rose John A. Ferrell, M.D. Victor G. Heiser, M.D. H. H. Howard, M.D. F. F. Russell, M.D. General Director
Director for the United States
Director for the East
Director for the West Indies
Director of Public Health
Laboratory Service

CHINA MEDICAL BOARD

George E. Vincent, Chairman

Wallace Buttrick Simon Flexner Raymond B. Fosdick Frederick L. Gates Frank J. Goodnow Roger S. Greene Vernon Kellogg
Harry Pratt Judson
John R. Mott
Francis W. Peabody
John D. Rockefeller, Jr.
Wickliffe Rose

William H. Welch

Edwin R. Embree, Secretary Margery K. Eggleston, Assistant Secretary

Roger S. Greene Henry S. Houghton Director

Acting Resident Director in China

DIVISION OF MEDICAL EDUCATION Richard M. Pearce, M.D., General Director

Assistance to Other Agencies

In addition to the work carried out through the departmental organizations described above, the Rockefeller Foundation has contributed during the year to the accomplishment of work undertaken by other and unaffiliated organizations.

On pages 82 to 83 will be found a summary of payments made by the Rockefeller Foundation for all purposes during the year 1921. This tabular summary outlines, in terms of expenditures, the work described in terms of aims and results in the President's Review. In many instances these payments involved sums expended

on account of appropriations made in former years. On the other hand, they represent in some instances but partial payments on many of the appropriations, made during 1921, which will provide for continuing work during succeeding years. For a full statement of the finances of the Foundation, see the Report of the Treasurer, pages 339 to 409.

TABLE 3: EXPENDITURES OF THE ROCKE-FELLER FOUNDATION FOR THE YEAR 1921

I.	PUBLIC HEALTH	
A.	International Health Board	
	1. Regular program in Hookworm, Malaria, Yellow Fever	,
	and County Health	
	2. Tuberculosis in France	438,951
	3. Fellowships and Public Health Education	82,696
В.		
	1. Mental Hygiene	86,371
	2. Hospital and Dispensary Service and Studies	84,823
C.	Schools of Public Health in the United States	333,375
		\$2,133,820
II.	MEDICAL EDUCATION	
Α.	China Medical Board	
11.	1. Regular program of aid to Medical and Pre-Medical	
	Schools and to Hospitals	\$419,705
	2. Peking Union Medical College	<i>p</i> 1123,100
	(a) Land and Buildings	1,114,973
	(b) Operation	393,349
	3. Fellowships and Scholarships	27,423
B.	London Medical Center	826,296
C.	Canadian Medical Program	1,158,853
D.	Central Europe: Journals and Apparatus	43,813
E.	Pasteur Institute	30,000
F.	University of Chicago—Interest on Pledge	43,739
G.	Fellowships and Scholarships	17,574
Н.	Brazil	12,169
I.	Commissions and Studies of Medical Education	31,367
•		\$4,119,261

SECRETARY'S REPORT

III. MISCELLANEOUS	
(Chiefly payments on previous pledges)	
A. American Academy in Rome—(Payments on 10-year	
pledge made in 1914)	\$10,000
B. American Medical Association—(Toward publishing	
Spanish Edition of Journal)	8,000
gram in Europe)	
D. Committee on Reference and Counsel of Annual Foreign	
Missions Conference of North America	
E. Common Service Committee—(For Correlation of Service	
of Health Agencies)	19,304
F. Concilium Bibliographicum, Zürich	
G. National Information Bureau—(For Membership for year	
H. National Research Council—(Fellowships in Physics and	1,000
Chemistry)	
I. New York Association for Improving the Condition of the	
Poor—(Payment on 10-year Pledge made in 1914)	
J. Rockefeller Institute for Medical Research and Johns	
Hopkins University—(For Special Investigations)	5,750
K. Grand Chenier Bird Refuge—Taxes and Expenses	7,713
L. Final Payments on Work begun in connection with War	
Emergency	2,682
	\$1,191,484
IV ADMINISTRATION	\$1,191,484 ———
IV. ADMINISTRATION	
A. Maintenance of Executive Offices and Treasurer's Office	\$170,123
	\$170,123 15,669
A. Maintenance of Executive Offices and Treasurer's Office	\$170,123
A. Maintenance of Executive Offices and Treasurer's Office	\$170,123 15,669
A. Maintenance of Executive Offices and Treasurer's Office B. Furniture and Fixtures, and Books	\$170,123 15,669 \$185,792
A. Maintenance of Executive Offices and Treasurer's Office B. Furniture and Fixtures, and Books	\$170,123 15,669 \$185,792 \$7,630,357
A. Maintenance of Executive Offices and Treasurer's Office B. Furniture and Fixtures, and Books Funds and Property As of December 31, 1921	\$170,123 15,669 \$185,792 \$7,630,357
A. Maintenance of Executive Offices and Treasurer's Office B. Furniture and Fixtures, and Books Funds and Property As of December 31, 1921 PRINCIPAL FUNDS	\$170,123 15,669 \$185,792 \$7,630,357
A. Maintenance of Executive Offices and Treasurer's Office B. Furniture and Fixtures, and Books Funds and Property As of December 31, 1921 PRINCIPAL FUNDS General Fund	\$170,123 15,669 \$185,792 \$7,630,357
A. Maintenance of Executive Offices and Treasurer's Office B. Furniture and Fixtures, and Books Funds and Property As of December 31, 1921 PRINCIPAL FUNDS General Fund	\$170,123 15,669 \$185,792 \$7,630,357
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A. Maintenance of Executive Offices and Treasurer's Office B. Furniture and Fixtures, and Books	\$170,123 15,669 \$185,792 \$7,630,357 =

LANDS, BUILDINGS, AND EQUIPMENT In China: Medical School Lands, Buildings, and Equipment In New York: Furniture and Equipment of Offices	\$8,631,833 34,980
	\$8,666,813
UNDISBURSED INCOME	
General Income (For offsetting liabilities see below)	\$7,359,001
Henry Sturgis Grew Memorial	4,862
-	\$7,363,863
UNPAID APPROPRIATIONS AND PLEDGES Balance due on appropriations payable in 1921 and prior years	\$4,032,998
1922	\$19,186,396
	\$23,219,394
	P43,417,374

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INTERNATIONAL HEALTH BOARD Report of the General Director

40.

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INTERNATIONAL HEALTH BOARD

Report of the General Director

To the President of the Rockefeller Foundation: Sir:

I have the honor to submit herewith my report as General Director of the International Health Board for the period January 1, 1921, to December 31, 1921.

Respectfully yours,
WICKLIFFE ROSE,
General Director.

INTERNATIONAL HEALTH BOARD

OFFICERS AND MEMBERS

GEORGE E. VINCENT, Chairman
WICKLIFFE ROSE, General Director
HERMANN M. BIGGS
WALLACE BUTTRICK
SIMON FLEXNER
RAYMOND B. FOSDICK
FREDERICK T. GATES
EDWIN O. JORDAN
T. MITCHELL PRUDDEN
JOHN D. ROCKEFELLER, JR.
FREDERICK STRAUSS
VICTOR C. VAUGHAN
WILLIAM H. WELCH

EDWIN R. EMBREE, Secretary FLORENCE M. READ, Assistant Secretary

PERSONNEL OF STAFFS DURING 19211

ADMINISTRATIVE STAFF

Wickliffe Rose, General Director

John A. Ferrell, M.D., Director for the United States

Victor G. Heiser, M.D., Director for the East

Hector H. Howard, M.D., Director for the West Indies

L. W. Hackett, M.D., Associate Regional Director (for Brazil)

FREDERICK F. RUSSELL, M.D., Director of Public Health Laboratory Service

FIELD STAFF

HOOKWORM

Australia (including Papua and late	W. A. Sawyer
German New Guinea)	S. M. Lambert ¹ C. N. Leach
	W. C. Sweet ²

BRAZIL	L. W. Hackett
	G. K. Strode

Paes de Azevedo (resigned)
Alagoas F. L. Soper (survey)

Alan Gregg
Espirito Santo G. K. Strode

Alan Gregg (survey)

J. H. Janney² (survey)

Pernambuco

Alan Gregg

Pernambuco
Alan Gregg
F. L. Soper
Rio de Janeiro
G. K. Strode
Rio Grande do Sul
Alan Gregg
F. L. Soper
Santa Catharina
Alan Gregg

F. L. Soper São Paulo G. K. Strode

British North Borneo C. H. Yeager

² Special Staff Member.

¹Personnel employed by Government in co-operative work not listed.

90 THE ROCKEFELLER FOUNDATION

British Solomon Islands (survey) S. M. Lambert 1

CEYLON W. P. Jacocks G. G. Hampton

G. G. Hampton C. N. Leach

S. A. Winsor (resigned)

COLOMBIA F. A. Miller

COSTA RICA Louis Schapiro
J. E. Elmendorf, Jr.

DUTCH GUIANA W. C. Hausheer

GUATEMALA E. I. Vaughn

J. E. Elmendorf, Jr.

INDIA J. F. Kendrick G. P. Paul

G. F. Faui

JAMAICA B. E. Washburn

NICARAGUA D. M. Molloy

PANAMA F. C. Caldwell

PORTO RICO R. B. Hill

Salvador C. A. Bailey

SIAM M. E. Barnes

H. R. O'Brien 1

Trinidad G. C. Payne W. C. Hausheer

J. L. Rice 1

COUNTY HEALTH WORK IN UNITED STATES

ALABAMA F. W. Dershimer

A. L. McKay (resigned)

Indiana G. P. Paul

Kansas A. J. Warren

Kentucky P. W. Covington

Special Staff Member.

LOUISIANA P. W. Covington
Hugo Muench, Jr. 1

New Mexico J. F. Docherty

D. B. Wilson

TEXAS A. P. Harrison 1

MALARIA

ALABAMA E. B. Johnson 1 (resigned)

William Ropes 1

ARKANSAS F. P. Gilbert¹

L. G. Hastings 1 (resigned)

William Ropes 1

Louisiana L. J. Petritz

Mississippi C. C. Bass¹

J. L. Clarke 1

Missouri M. F. Boyd

NICARAGUA F. E. Hulse¹

NORTH CAROLINA H. A. Taylor

C. E. Buck 1 (resigned)

I. I. Mieldazis 1

PORTO RICO H. W. Green 1

South Carolina J. J. Mieldazis 1

TENNESSEE H. A. Johnson 1 N. H. Rector 1

Texas E. H. Magoon ¹

Geo. Parker 1

Virginia E. H. Gage 1 (resigned)

YELLOW FEVER

YELLOW FEVER ADVISORY COUNCIL²

Henry R. Carter, M.D., Assistant Surgeon General, United States Public Health Service

¹ Special Staff Member.

² Not Staff Members; appointed to serve in an advisory capacity.

Juan Guiteras, M.D., Secretary, Department of Health and Charities, Cuba

Hideyo Noguchi, M.D., Rockefeller Institute for Medical Research Joseph H. White, M.D., Assistant Surgeon General, United States Public Health Service

MEXICO AND CENTRAL AMERICA

T. C. Lyster 1

British Honduras

E. I. Vaughn E. I. Vaughn

H. K. Marshall¹ (resigned) T. F. Botello¹

Honduras Mexico

E. I. Vaughn C. A. Bailey J. H. White¹ B. W. Caldwell¹

Nicaragua

M. E. Connor W. M. Monroe E. I. Vaughn D. M. Molloy C. A. Bailey

Salvador

W. H. Davies 1 (resigned)

Peru

J. H. White 1

TUBERCULOSIS

FRANCE

L. R. Williams ¹
Alexander Bruno ¹
F. Elisabeth Crowell ¹
B. L. Wyatt ¹ (resigned)

SPECIAL

Australia-Public Health Administration

A. J. Lanza 1—Lent to Department of Health for two years to assist in organization of Department of Industrial Hygiene

F. F. Longley —Lent to Department of Health for two years to assist in organization of Department of Sanitary Engineering

Brazil—County Health Work

J. H. Janney 1

Public Health Nursing Service Mrs. Ethel Parsons ¹

School of Hygiene and Public Health, São Paulo W. G. Smillie, Director and Professor of Hygiene

¹ Special Staff Member.

CHINA-SPECIAL SERVICE

J. B. Grant-Lent to Peking Union Medical College as Associate Professor of Hygiene and Public Health

CZECHOSLOVAKIA—PUBLIC HEALTH ADMINISTRATION S. M. Gunn ¹

PARAGUAY—PUBLIC HEALTH SURVEY
L. W. Hackett

Philippine Islands—Public Health Survey
V. G. Heiser

ON LEAVE

(for whole or part of year)

W. T. Burres
S. T. Darling ¹
H. H. Howard
J. J. Mieldazis ¹
Louis Schapiro

AT HOME OFFICE

C. W. Wells (in charge of fellowships)
J. L. Hydrick

ENGAGED IN SPECIAL STUDY (Johns Hopkins School of Hygiene and Public Health)

S. T. Darling ¹
J. B. Grant
Louis Schapiro

IN TRAINING

Australia	C. N. Leach W. C. Sweet ¹
Brazil	J. H. Janney ¹
CEYLON	C. N. Leach
Mexico	W. M. Monroe
Siam	H. R. O'Brien 1
TENNESSEE	H. A. Johnson ¹ N. H. Rector ¹

¹ Special Staff Member.

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PROMOTING HEALTH IN MANY LANDS

The period of three years since the armistice has been one of unprecedented activity in government organization for war on disease: new national health services, including new ministries of health, have been created in England, France, Australia, Czechoslovakia, Poland, and the kingdom of the Serbs, Croats, and Slovenes; in other countries national and state services have been reconstituted with enlarged powers and resources; public funds for health purposes have been enormously increased; and the call for qualified men is being met by the establishment of institutions to provide the training required. During the year 1921 the International Health Board has shared in activities designed to promote this movement in sixty-three states and countries throughout the world.

I

International Co-operation in Yellow Fever Control

There are important public health functions which are essentially international in character. No nation acting alone can perform them. Among these is the control of the great epidemic plagues of which yellow fever is a conspicuous example. For more than 200 years prior to the

work of Reed and his colleagues at Havana the tropical and semi-tropical regions of the Americas had been subject to devastating invasions of this disease. During this period appalling epidemics swept repeatedly over the coastal regions of Brazil as far south as Rio de Janeiro, up the Amazon valley, along the Caribbean littoral, throughout the West Indies, Central America, Mexico, and the southern United States, and over the west coast of America from Callao in Peru to Mazatlán in Mexico. The infection had crossed the sea to West Africa; had apparently become endemic there; and had appeared from time to time in places as remote from its original source as England, France, Spain, and Italy. No country had the power of self-defense. Despite the

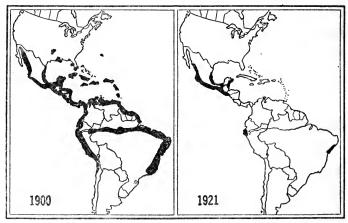


Fig. 12.—Yellow fever map of the Western Hemisphere. The shading indicates localities in which one or more cases of the disease appeared. Compare 1921 with 1900. The disease is steadily retreating as the concerted attack progresses

most rigid quarantine regulations the infection overran national boundaries, decimating populations, paralyzing industry and trade, and holding the people of these regions in a state of perpetual dread.

Reed and his commission discovered the key to yellow fever control. By international concert of effort the infection, so far as the Western Hemisphere is concerned, has been pretty well delimited and its boundaries are being steadily driven in (see Fig. 12, page 96).

Fighting an Epidemic in Peru

The Pacific coast from Panama to Callao in Peru is treated as a unit. Since the days of Gorgas in Panama a low Stegomyia index steadily maintained has protected that community against reinvasion. Recent inspection in Buenaventura, Colombia, indicates satisfactory conditions with no traces of danger in that port of entry. No case has been reported from Ecuador since May, 1919. Dr. Pareja, local health officer, is holding the mosquito index in Guayaquil below the danger point as a safeguard against reinvasion from Peru.

The scene of active operations on this coast during 1921 has been in Peru. At some time preceding its elimination from Ecuador in 1919 it had crossed the border into Peru and had become

well established there before being recognized as yellow fever. Because of limited funds and lack of trained personnel, first efforts at control were on an inadequate scale. By March, 1920, the disease had appeared in serious epidemic form

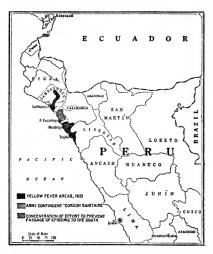


Fig. 13.—Scene of the violent yellow fever epidemic in Peru during 1921

over a wide region in the department of Piura and is estimated to have numbered about 6,000 cases before its final suppression in August of that year. Again the infection escaped. Just before its final extinction in Piura it had crossed a

desert zone which had been depended upon to protect the region farther south, and under the guise of "acute malaria" had established itself in the department of Lambayeque. With a dense, non-immune population and an extremely high Stegomyia index—from 60 to 100 per cent—it spread with great rapidity. From Lambayeque the epidemic extended south through the department of Libertad with an estimated total of from 10,000 to 15,000 cases.

Controlling the Epidemic with Fish

In February, 1921, Government placed Doctor Henry Hanson in charge of the campaign with full authority. The International Health Board was called upon to supplement available funds. Competent local physicians were enlisted; a limited number of trained inspectors were brought down from Panama; and as rapidly as possible systematic operations were organized to cover not only the infected area but also a considerable barrier zone lying south of the region of known infection. All effort was centered on the control of Stegomyia breeding.

Here as in Guayaquil the result was finally accomplished by enlisting two local species of fish to devour the eggs and larvae of the mosquito. An attempt in the beginning of the campaign to teach the people to prevent breeding on their own premises failed. Everything had to be done by the mosquito squad. Effort to keep water containers covered was equally unsuccessful. Straining the water (which in that dry country was too precious to be turned out) involved an amount of labor that made it impracticable for a region so It was found that by distributing fishtwo to four small fish to a container holding ten to fifteen gallons—the problem was simplified by about 75 per cent, with a lower resulting mosquito index than it had been possible to get in any

other way. The 750,000 fish distributed in this drive conquered the epidemic. The last case was reported from Libertad on July 16.

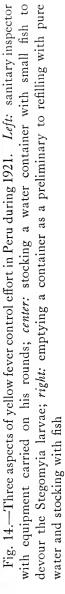
No case has been reported from Piura since August, 1920, and there has been no known case anywhere in Peru since July, 1921. So vast, however, is the region covered by the epidemic and so often has the infection lingered unrecognized in remote communities that one would not venture at this time to declare the country free. As a precaution against the reappearance of the disease the drive against Stegomyia is to be continued up to May, 1922. It will cover the entire region from Ecuador to Callao-a distance of 500 miles—and from the sea back to the mountains—a zone varying in width from fifty to seventy-five miles. If up to that time no case shall have appeared the forces will be demobilized.

Yucatan a Historic Center of Infection

As Guayaquil for more than seventy-five years had served as the endemic focus from which yellow fever has spread from time to time over the Pacific coast, so Merida, in Yucatan, has been regarded by sanitarians as an important seed-bed of long standing from which the infection has been distributed repeatedly throughout Mexico and the Central American countries.







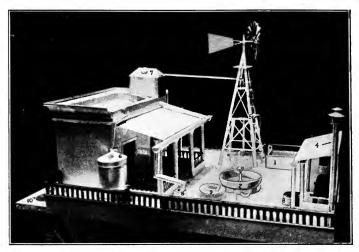


Fig. 15.—A small model showing the types of water containers used about the dwellings in Merida, Yucatan. The exhibition of this model, made of scrap tin by an inspector in his spare time, did much to arouse the interest of householders in preventing mosquito breeding

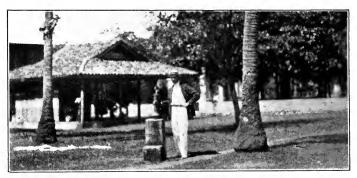


Fig. 16.—Shallow, driven tubular well for preventing Stegomyia breeding, Corinto, Nicaragua. The placing of fish in the open wells of this town freed the water of larvae, but frequent careful inspection was necessary. The driven well has solved the problem. A small block and platform of concrete are adequate to protect it

Recent archeological studies in Yucatan have given the subject an added interest. They bring to light the records of devastating yellow fever epidemics in the Maya cities of this densely populated region antedating the Spanish invasion. It is to this cause Dr. Spinden attributes the depopulation of these ancient cities and the decay of Maya civilization in the lowlands bordering the Gulf. It is one of the great plagues of the early Spanish records. Throughout modern times it has remained a scourge of this region, with Merida as an important source of infection. Within the last few years the disease has appeared in epidemic form throughout eastern Mexico, on the Mexican Pacific coast from Mazatlán to Guatemala, in Guatemala, Salvador, Nicaragua, Honduras, and British Honduras.

Winning by Team-Play

No one of these countries acting alone could protect itself. The effort was much like attempting to empty a spring with a spoon. Guatemala, for example, suppressed an epidemic which had spread to sixteen communities on the Pacific coast in 1918, only to have the infection reintroduced the following year. Now, by international co-operation, control measures over this

¹Yellow Fever—First and Last. By Herbert J. Spinden. World's Work, December, 1921, p. 169-181.

entire region are being administered as a unit. Active operations in each country are being carried out by a yellow fever commission created by special decree, under the national departments of health and clothed with authority. The necessary unity of effort is secured by the simple device of giving the International Health Board representation on each of these commissions.

This united drive opened in Salvador, Nicaragua, Guatemala, and Honduras in 1920; in Mexico in January, 1921; and in British Honduras in August, 1921. The Mexican department of health had been active on its own account during the previous year and had done much to reduce the severity of the epidemic that had swept over the eastern part of that country from Yucatan to Tampico. In this campaign as in Peru effort is centered on the control of Stegomyia breeding. The problem has been enormously simplified by permanently sealing the domestic tanks and by using larvae-devouring fish in all containers holding sufficient water to support fish life. By the introduction of these two simple devices in Guayaguil in 1919 Dr. Connor had been able to reduce his field staff for a given area from 139 men to twenty men. Experience during 1921 abundantly confirms the result.

War on the mosquito is conquering the disease. At the present time there seems to be no yellow fever in Merida or anywhere in Yucatan. The important base ports of Campeche, Vera Cruz, Túxpan, and Tampico are being held with a Stegomyia index sufficiently low to prevent the transmission of infection within these communities; and from these centers control measures are

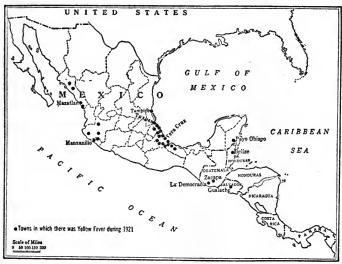


Fig. 17.—Map of Mexico and Central America showing towns visited by yellow fever in 1921

being gradually extended to the outlying communities. A smouldering infection still remains in a back-country region about Papantla; in a densely populated agricultural valley west from Cosamaloapan in the southern part of the state of Vera Cruz; and along the Gulf coast in British Honduras from Belize to Santa Cruz de Bravo in Quintana Roo. Within recent months system-

atic mosquito control has been undertaken on the Mexican Pacific coast, where the infection seems to have been appearing from time to time for the

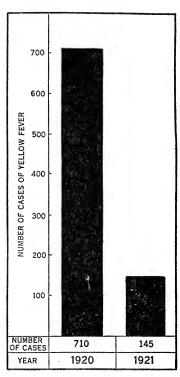


Fig. 18.—Yellow fever cases in Mexico and Central America, 1920 and 1921. Control effort is being continued to stamp out the infection

last three years over a vast region from Manzanillo to Mazatlán. These remaining areas of infection should involve no particular difficulties. No case of vellow fever has been reported from Nicaragua, Salvador, Guatemala, or Honduras for more than ten months. The number of cases reported from Mexico and Central America for 1920 was 710; for 1921 the total number of reported cases is 145, as shown in Fig. 18.

Government Continuing the Attack in Brazil

The other remaining center of yellow fever on the Western Hemisphere is in Brazil. The infection, formerly covering the entire coast from Rio de Janeiro north and up the Amazon valley to Yquitos in Peru, seems now to be confined to a narrow coastal zone from Pernambuco to Bahia. These two cities are presumably the endemic foci. In April an epidemic was reported in the state of Bahia. It had apparently been in progress for months, had spread over a considerable area, and numbered from 400 to 500 cases. Cases were reported also from Natal in Rio Grande do Norte, from Porto Calvo, Alagoas, and from the district between Alagoas and Pernambuco.

Until the last vestige of yellow fever has been stamped out here this region must be recognized as a constant menace to the rest of Brazil, to the coasts of Venezuela and Colombia, and to the neighboring West Indies. Freedom from the disease for a considerable period has given opportunity for the development in these countries of a non-immune population. A reinvasion at this time would probably be vastly more disastrous than it could have been ten years ago. The Brazilian national department of health is continuing the fight against the disease in and about Pernambuco and Bahia, and has ample funds for the purpose.

Yellow Fever Commission to West Africa

In 1920 the Board sent a commission to West Africa to determine if possible whether yellow

fever is present in that region, and if so, whether control measures would be feasible. The commission visited the Belgian Congo, Dahomey, Gold Coast, Northern Nigeria, Senegal, Sierra Leone, and Southern Nigeria; saw no case of yellow fever; conferred with medical authorities and examined many records; found strong indications of the presence of the infection within recent years; and recommended that a second commission be sent out prepared to stay, if necessary, for a period of two years for a more extended investigation—this to include a laboratory study of the suspected fevers of the region. The Board has approved. The fixing of the date of departure for this second commission must await the necessary arrangements with governments concerned, the special training of laboratory personnel, and the development of operations in other fields making possible the release of clinical specialists for the staff.

The Noguchi Vaccine and Serum

Killed cultures of Leptospira icteroides as a protective vaccine against yellow fever were first prepared and tested by Noguchi in Guayaquil in 1918. The use of the vaccine with laboratory animals had demonstrated its value in producing immunity. During the year 1920 it was used on a considerable scale on human subjects in Mexico

and Central America, and the test was continued during the year 1921 in these countries and in Peru. The cumulative results of the two years' experience tend to confirm the earlier indications. To take a single striking example, Dr. Hanson vaccinated 200 non-immune soldiers in Lambayeque, Peru, and 200 civilians in Paijan. They went through a severe epidemic without a case among them. Continued tests of the therapeutic serum tend also to support the earlier results. When administered in the early stages of the disease it seems greatly to increase the chances of recovery.

П

Extending the Front against Malaria

Despite the economic depression which hit the Southern States with extreme severity, the fight against malaria has been maintained and steadily extended. A series of field experiments carried out in previous years had shown that malaria control in towns having a population of 1,000 or over and representing average conditions in these states is a paying investment. Effort was made during the year 1920 to drive this fact home throughout the more heavily infected region. By joint arrangement state departments of health, local communities, the United States

Public Health Service, and the International Health Board shared in carrying out demonstrations in fifty-two towns in ten states during 1920. In some communities control was effected mainly by the top minnow (Gambusia affinis).

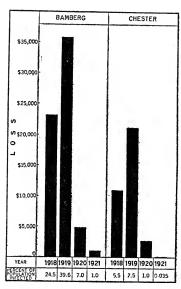


Fig. 19.—What malaria has cost the towns of Bamberg and Chester, South Carolina, during the years 1918 to 1921, inclusive, in the form of wages lost, doctors' bills, and medicines. Combined population, 7,768. Control measures instituted in both towns in 1920 have strikingly reduced this economic loss

Malaria cases in these communities were reduced from 30 to 98 per cent at an average per capita cost of about seventy-eight cents. These results graphically exhibited were given wide publicity. The effect has been the creation of a sustaining and even aggressive public opinion which would seem to guarantee the permanency of the work.

During the year 1921 the service has been consolidated

and extended. State and local funds have been increased. Malaria control is being made an integral part of the county health program and the states are assuming the responsibility

for its central supervision. Six states—Alabama, Arkansas, Mississippi, Missouri, South Carolina, and Virginia—have provided central administrative budgets and are appointing specially trained personnel for the purpose. To meet

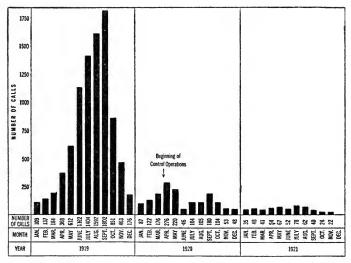


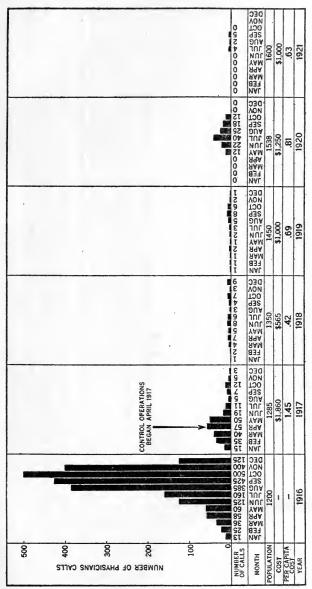
Fig. 20.—Reduction in physicians' calls for malaria in Groveton and South Groveton, Texas. Combined population, 2,500. Control operations beginning on April 1, 1920, strikingly checked the development of malaria cases during the remainder of 1920 and in 1921 kept the number of cases at a mere fraction of the number in 1919, which was typical of conditions in pre-control years

the increasing demand for sanitary engineers and physicians who have had special training in this field, the Board has undertaken to maintain a considerable reserve corps through a period of apprenticeship. On completion of their training they are taken into federal, state, or county service. Intensive demonstrations have been undertaken during 1921 in twenty-six additional towns. In a number of communities—as in Texas for example—the municipal governments have provided the entire cost of the work save that of general supervision. For typical results see Figs. 19 and 20, pages 110 and 111.

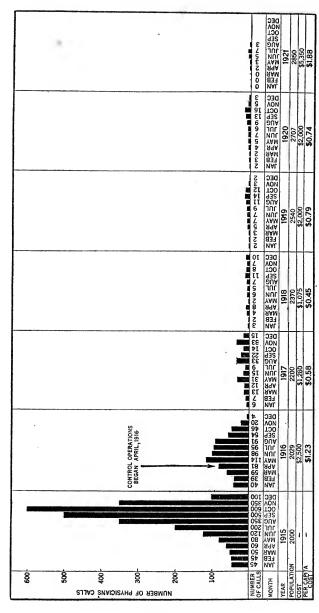
Malaria Control on a County-Wide Scale

Field experiments in which the Board has shared hitherto have had for their object the testing of separate control measures: mosquito control in small towns; mosquito control in a typical rural community; quinine for sterilizing the blood of the infected; protection by the screening of houses. These nibbling efforts have served their purpose. During the year 1921 a major attack against malaria has been opened along the entire front, including town, village, and the open country. The unit of operations is the county. Malaria control is undertaken as a part of the permanent county health scheme; is supported by state, county, and local funds; and is under the direction of the county health officer.

All available measures are employed, each receiving emphasis according to local conditions. In Alabama, where an energetic sanitary engineer is co-operating with the health officers in a group



function. This town and Crossett, Arkansas, were the scenes of the International Health Board's Fig. 21.—Record of malaria incidence for town of Hamburg, Arkansas, which has maintained antimosquito measures for five successive years. The work is now regarded as a regular municipal first participation in malaria control by anti-mosquito measures



ditches and culverts was laid. The town is finding it much more economical to protect itself against Fig. 22.—How malaria has been brought under control in Crossett, Arkansas. The anti-mosquito measures inaugurated in 1916 have been continued year by year, and in 1921 a system of concrete malaria than to suffer the losses the disease involves

of five counties, mosquito control is being extended to rural communities. The top minnow -shown by Dr. Howard in his experiment in Mississippi to be effective and economical in controlling mosquito breeding about farm houses —is the principal agent here. The farmers are maintaining minnow ponds from which mosquitobreeding waters may be easily stocked with fish. In the Mississippi delta, on the other hand, where mosquito control is less feasible, antimosquito measures are not neglected where conditions favor, but greater emphasis is being placed on sterilizing quinine treatment. In all counties where the work has been undertaken the people are being taught to screen their houses as a protection against flies and mosquitoes. The standard quinine treatment for those who have malaria is provided at convenient points and its use is being stimulated by systematic education. This county-wide effort is being undertaken not as a brief intensive drive, but as a slow, steady campaign to be continued over a period of years.

Field Experiments in Malaria Control

A limited number of field experiments are being continued. As a result of Dr. Bass's work in Bolivar and Sunflower counties in Mississippi a standard quinine treatment for malaria in this region has become established and its use is being

gradually extended to other counties and states. At Mound, Louisiana, tests are being carried out with a view to getting additional information on the screening of houses as a factor in malaria control; the effect of the location of houses, in relation to mosquito-breeding places, on the incidence and severity of malaria; effect of killing adult mosquitoes in homes; control of mosquito breeding by top minnows and wave action, in connection with impounding water in bayous and keeping down the marginal vegetation by pasturage. An experiment has been undertaken in Nicaragua to test the control of mosquitoes in a small town, under tropical conditions, by the simple and relatively inexpensive measures that have been successful in the Southern States. A similar test is being conducted in Porto Rico in an agricultural area.

III

Fighting Tuberculosis in France

The commission which the Board sent to France in 1917 to aid in organizing a national crusade against tuberculosis is well within sight of the end of its task. Responsibility is being rapidly transferred to French authorities. When the work began four years ago the French government and people were bearing the burdens of a devastating war and were carrying the additional



Publicity measures are an essential Fig. 23.—Tuberculosis exhibit at Pasteur Institute, Paris. feature of the campaign against tuberculosis in France

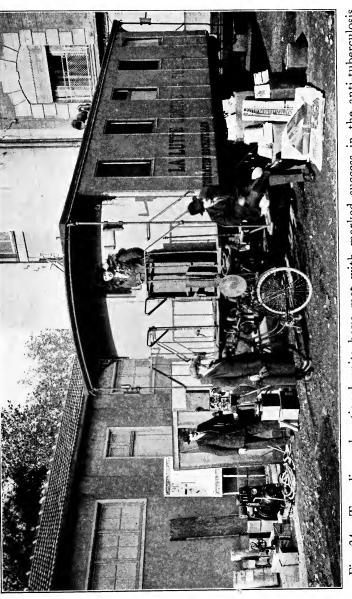


Fig. 24.-Traveling educational units have met with marked success in the anti-tuberculosis and equipment. During 1921 fifteen departments were visited; 1,294 lectures were delivered to work in France. Motors cars and a special railway car have been used for transporting personnel audiences aggregating 470,078; and a total of 3,594,500 pieces of literature were distributed

weight of a heavy tuberculosis rate which, as in all the warring countries, was supposed to be on the increase. There were in the country at that time but twenty-two tuberculosis dispensaries, and for persons needing hospital or sanatorium care not more than 8,000 beds.

To meet the situation a great multiplicity of agencies—French and American, official and non-official, military and civilian—pooled their interests in a spirit of team-play that made possible a coherent program. A scheme was projected on a national scale. It undertook to promote the establishment of tuberculosis dispensaries; to develop nursing schools for the training of public health visitors; to provide graduate courses for the training of doctors for the service; to establish a central records and statistical service; to conduct a nation-wide campaign of popular education; and in the end to stimulate the provision of hospital beds and sanatoria for the cases that need such care.

This united effort has met with enthusiastic response. The whole of France has been reached through the press and by literature in the schools. Mobile exhibits with teaching personnel have covered systematically fifty-four departments. In sixty-four departments the usual organization has been set up, providing for the operation of dispensaries and the maintenance of

hospital beds. The national government is granting subventions for the building of sanatoria. Eight training schools for public health visitors are in operation; and of these, five seem to be on a permanent basis. Beginning with 1922 all but one are to offer a two-year course. Diplomas have been given to about 250 women who have completed the course and who are now serving, some of them as departmental supervisors, the others in local dispensaries. The graduate course in tuberculosis, which from the beginning awakened unexpected interest, has been completed by 264 dispensary physicians. All activities undertaken in 1917 may be regarded as rooted in French soil; they are being supported by Government and the people. The commission has been dissolved. Dr. Linsly R. Williams with a limited American staff represents the Board in completing the transfer of responsibility. Comradeship in this service to all who have shared it has been an inspiring privilege.

IV

Using the Hookworm in Promoting Public Health

Of the estimated seventeen hundred million people inhabiting the globe, something more than nine hundred million live in countries where hookworm infection is a serious menace to health and working efficiency. With increasing pressure for the development of tropical and subtropical lands the control of this disease—as of malaria and sleeping sickness—becomes a matter of serious international concern. Hookworm disease has been selected by the Board for special consideration, however, not primarily because of its relative importance as a disabling disease, great as that is, but rather because it lends itself readily to purposes of demonstration in disease control. It serves at once as an end in itself and as a convenient means to a larger end. The work, while bringing immediate relief to hundreds of thousands of suffering people, is at the same time serving the more useful purpose of creating a popular sentiment in support of permanent agencies for the promotion of the public health.

During the year the Board contributed toward demonstrations in hookworm control in forty-three states and countries throughout the infected zone; completed infection and sanitary surveys in the states of Alagoas and Espirito Santo, Brazil, in New Guinea, in the British Solomon Islands, in Tasmania, and in Queensland; and began surveys which are still in progress in New South Wales, in Western Australia, and in Northern Territory, Australia. Arrangements were entered into with Government for a series of demonstrations in Mauritius and Honduras. Re-infection surveys to determine re-

sults of previous work and to serve as a stimulus to further effort were carried out on a countywide scale in forty-five counties in the Southern

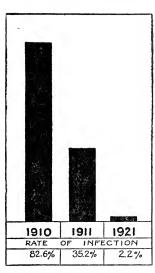


Fig. 25.—The hookworm story of Richmond county, Virginia. When the first demonstration in hookworm control in the United States was begun in this county in 1910, 82 per cent of the school children were infected. As a result of intensive treatment the infection was reduced in fifteen months to 35 per cent. Local agencies set in motion in 1910 have kept up the work until now hookworm infection in that county is negligible

United States and in a number of smaller areas in Jamaica and Brazil.

The character of the work and the policy underlying its administration are well illustrated in

The First Field Demonstration

The first systematic effort to control hook-worm disease in the United States was undertaken in 1910 in Richmond county, Virginia. It was under the direction of the Virginia State Board of Health, with the Rockefeller Sanitary Commission supplying

the funds. An infection survey made in April of that year showed an average infection of 82.6 per cent among the school children. In one large section of the county the infection was found to in-

volve practically the entire population and to be extremely severe. There followed an intensive effort to examine all the people; to treat those who were found infected; and by house-to-house visits to give them a definite understanding of the importance and the means of preventing soil pollution. Sanitary leagues were organized in local communities. Latrines were installed at all the schools and by persistent effort were gradually brought into use at nearly all the homes.

A second survey made in the summer of the following year showed that the infection among the school children had dropped from 82.6 to 35.2 per cent. Then the interesting thing happened. Outside aid was withdrawn; the county and its communities were left to their own devices. A third survey made ten years later in the summer of 1921—showed that the infection among school children had dropped to 2.2 per cent. The first intensive demonstration in 1910, while reducing hookworm infection from 82.6 to 35.2 per cent, set in motion permanent local forces which within ten years have reduced the infection rate to the negligible fraction of 2.2 per cent (see Fig. 25, page 122).

And while conquering hookworm these same forces are conquering typhoid and dysentery as

well. The recent survey referred to above showed that the people have latrines at their homes and are using them. Only two negro homes, two white tenant homes, and one white home owned by the occupant, were found without such protection. The late Dr. Fisher, who had been a practicing physician here for more than thirty-five years, stated that typhoid and dysentery used to bulk large in his practice. He had not had a case of either of these diseases for more than five years. He also reported-and the statement is abundantly supported by the facts as observed by the General Director, who visited the community in June, 1911, and again in November, 1921—that the economic and social changes which have come within this time are quite as great as the improvement in health.

Results in Eleven States

The service inaugurated in 1910 in Richmond county was extended rapidly to the more heavily infected counties of eleven southern states. Results similar in character—though less on the average in degree of control—have been accomplished throughout this infected region. Resurveys carried out on a county-wide scale, and based on the examination of school children—as were the original infection surveys

of 1911-1914—have been completed in fifty-six counties; more than 29,000 children have been examined in these recent tests. The results show, for the fifty-two counties for which comparative records are now available, a decline in the

average infection rate from 57.8 per cent in 1911-1914 to 27.7 per cent in 1920-1921. The change wrought in the physical appearance of the people is obvious even to the casual observer. As in Rich-

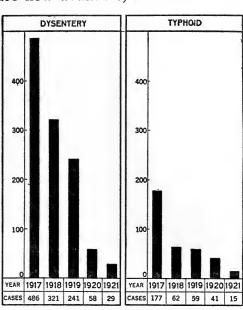


Fig. 26.—Decline in incidence of dysentery and typhoid fever, Troup county, Georgia, 1917–1921, inclusive. The prevention of soil contamination, brought about through the work of the county health departments, accomplishes not only the control of hookworm but of other soil-borne diseases as well

mond county, so over the larger region, typhoid and dysentery also are being brought under control (see Fig. 26).

The point to be emphasized is that although the original intensive demonstrations in which nearly

three fourths of a million people were treated in these states contributed to the immediate reduction of the infection both in degree and in prevalence, the results have been accomplished in the main by permanent local agencies rooted in the

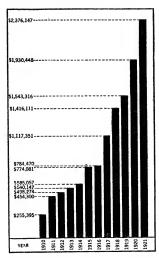


Fig. 27.—Appropriations of legislatures to state boards of health in eleven southern states 1910–1921. Includes funds for anti-tuberculosis work

soil. These forces are continually active, are committed to the task, and may be depended upon to complete it.

Board's Work Completed

The object which the Board had in view has been accomplished. During the year the arrangement by which the Rockefeller Sanitary Commission and later the International Health Board had shared with the states in measures for

the relief and control of hookworm disease was brought to a satisfactory close. Heads of health departments have seen develop in these states, in response to their efforts, a strong public sentiment in support of sound and aggressive public health policy. State legislative appropriations for health purposes have increased more than nine-fold during the eleven years (see Fig. 27, page 126). County health departments supported in the main by county funds have developed and are developing more rapidly than it has been possible to provide properly trained men (see Fig. 65, page 206).

Termination of the Board's participation in measures directed specifically to the control of hookworm disease does not disturb working relations with these states. It makes possible rather a transfer of funds to the further development of the more general county health program, to the fight against malaria, and to the training of personnel for the technical and administrative positions which are being created.

Testing Results in Brazil

With a view to testing the effectiveness of field operations in Brazil Dr. W. G. Smillie, Director of the Institute of Hygiene at São Paulo, made a resurvey during the year in two communities within the Federal area. The test was based on worm counts. Though the usual microscopic examination of stools showed but slight reduction in the percentage of persons infected in either of these communities, the number of parasites expelled showed a striking result. In one of the two communities where latrine construction had not been thorough the group that had been treated

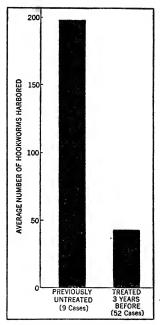


Fig. 28.—Control of hook-worm disease as result of campaign measures applied in 1918 in Jacarepagua, Brazil. In that year the infected inhabitants harbored on an average approximately 200 worms; in 1921 they harbored only forty-two

treatment averaged approximately 200,—a reduction of 79 per cent. In the other community where latrine construction had been more thorough the test indicated that the original campaign, with

at the time of the original demonstration harbored on the average forty-two parasites per person, while a group that had escaped

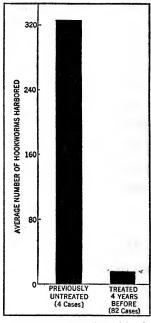


Fig. 29.—Reduction of hookworm disease as result of control measures, Governor's Island, Brazil. (In this graph and in Fig. 28 the cases represented by the bar "Previously Untreated" are few in number because the population of both places is largely transient. No considerable number of persons could be found in 1921 who had lived there and had not been treated at the time of the original campaigns in 1917–1918)

the continued operation of local forces, had within four years' time reduced by 95 per cent the num-

ber of hookworms harbored (see Figs. 28 and 29, page 128).¹

Transferring Responsibility to Brazilian Government

The work inaugurated in 1916 in the state of Rio and rapidly extended to the Federal area and eleven states is being taken over by government authorities as part of a permanent scheme of rural sanitation. For this purpose appropriations, state and federal, have increased from \$12,556 in 1917 to \$2,072,500 in 1921 (see Fig. 31, page 130). The Board is



Fig. 30.—Effect of treatment and the installation of latrines on severity of hookworm infection. Worms harbored by typical untreated rural residents of Brazil compared with those harbored in 1921 by the rural residents of Governor's Island, who were treated three years previously

gradually transferring its funds from demonstrations in hookworm control to the development of a county health organization; the introduction of a public health nursing service;²

2 See page 153.

¹ For details, see The Results of Hookworm Disease Prophylaxis in Brazil, by Wilson G. Smillie. *The American Journal of Hygiene*, January, 1922, v. 2, No. 1, pp. 91-94. Same reprinted.

field experiments in the fight against malaria; and the development of a school of public health.¹ An arrangement has been entered into—the state, the county, and the Board providing the funds for the first demonstration of county health

YEAR 1917 1918 1919 1920 1921
TOTAL \$12,556 \$50,000,9521,000 \$950,000 \$22,072,500
STATE 8-8-728 \$350,000 \$420,000 \$475,000 \$1,277,500
FEDERAL \$42,278 \$250,000 \$50,000 \$475,000 \$1,277,500

Fig. 31.—Increase in funds for rural sanitation appropriated by Federal and local governments in Brazil, 1917–1921

service in the state of São Paulo.

Progress in Permanent Sanitation in the West Indies

An illuminating field study carried out in Trinidad during the year by Cort and Payne² proved to be a striking demonstration of the effectiveness of the measures that are being carried out on a large scale in many lands, and particularly of the soundness of government policy in

building up sanitary organizations to make the results permanent.

Governments are becoming increasingly active in Dutch Guiana, British Guiana, Trinidad, Porto Rico, and Jamaica, in providing funds, increasing their sanitary staffs, and in carrying out

¹ See page 144.

² Summarized on pages 175 to 180.

practical operations in the field. For the year 1921 Porto Rico appropriated \$800,000 for public health purposes, including a tuberculosis sanatorium; set aside \$30,000 of this—in addition to the necessary overhead—for the fight against hookworm disease; and with an effi-

cient field staff under central direction established a creditable standard of soil sanitation in all areas of operation well in advance of the mobile clinics. The present field staff is to be the nucleus of a permanent system of inspection.



Fig. 32.—States of Brazil that have funds available for a program of rural sanitation. Most of the states are receiving Federal aid

In Trinidad Government has committed itself to the support of a general scheme of public health; has recently appointed one medical officer of health with provision for a second; has inaugurated a comprehensive plan of malaria control; is providing about \$35,000 a year for the maintenance of its sanitary staff; has recently added to it three European inspectors; and has in progress an extensive program of latrine construction. In

Dutch Guiana, where only recently operations were resumed after enforced suspension during the war, Government is giving energetic support;

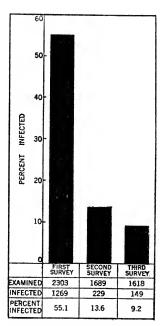


Fig. 33.—Reduction of hook-worm infection rate on estates in the Vere area, Jamaica, First survey, November, 1919; second survey, May to October, 1920; third survey, August, 1921. The estate management is continuing systematic treatment and also installing latrines in an effort to stamp out the infection

has provided a staff of sanitary inspectors for Lower Surinam and Lower Pará; and with the hearty co-operation of the estates population is effecting a thoroughgoing reform in these regions.

In Jamaica the harassing—and at times apparently hopeless—inertia that early effort in the island had to face has yielded to a popular interest that is becoming increasingly general and aggressive. A striking demonstration in one community shows a fall in infection rate from 55 per cent in 1919 to 13 per cent in 1920, and to 9 per cent in 1921 (see Fig.

33). Areas of operation are now being sanitated in advance of treatment. A conference of parochial boards in December adopted a resolution

approving the appointment of a superintending medical officer for the colony and a whole-time health officer in each of the parishes, with adequate field staff to establish a system of inspection. Government is preparing to expend \$100,000 on sanitation during the year 1922.

Developing National Health Organization in Central America

In Central American countries—and particularly in Costa Rica, Nicaragua, and Salvador measures undertaken in 1914 and 1915 against hookworm disease have passed successfully through the primary stage of field demonstration. Responsibility is being gradually transferred to government authorities, and control of the one disease is being merged into more general schemes of public health. In Panama, where development of local initiative has been stifled by the paternalistic policy of the Canal Zone, the formation of a responsible department of health is now being considered. Government is slowly developing a sanitary staff and is providing \$12,500 a year for the work of the department of uncinariasis, or hookworm control.

In Costa Rica the service was formally taken over on May 28, 1921, as a division under the newly established national department of health,

and the Board's representative was withdrawn. A limited contribution toward its maintenance is being continued through 1922, and provision has been made by means of fellowships for the training of additional men for the posts that are being created. In Nicaragua a commission appointed for the purpose by the President has drafted a sanitary code for the country and a law establishing a national department of health to carry it out. The Board is lending the services of a trained scientist to organize and direct a modest diagnostic laboratory, and is providing for the training of a limited number of native doctors for the new government service. The division of uncinariasis is to be the nucleus around which the new department is to be formed.

Salvador has had a national health organization for many years. During the year Government has reconstituted it in the interest of more aggressive action in the field. The new scheme correlates the various government medical services under central control; provides new and adequate quarters; reinforces the staff; creates a public health laboratory; takes over as one of its divisions uncinariasis control; and provides an annual budget of 170,000 colones, in addition to supplying 26,000 colones for the relief and control of hookworm disease and half the funds needed for the fight against yellow

fever. The Board undertakes to aid in the training of additional men.

Promoting Public Health in the Far East

In the Far East the Board is sharing in a wide range of activities representing pretty well all stages of public health development. In Borneo the first demonstration in the control of hookworm opened with Government supplying a large part of the funds and the native population giving willing co-operation. In Fiji, where operations had been suspended during the war, adequate latrine accommodations were installed over a wide area preparatory to reopening the clinics early in Government is to assume entire re-1922 sponsibility at the end of three years. The infection survey of Mauritius—completed in 1920 —led to an arrangement by which the Board is to share on a sliding scale for a period of three years in a series of demonstrations in control measures. leaving Government at the end of that time in full charge. In the meantime aid is being given in the training of local men. In Madras Presidency, India, where surveys made between 1915 and 1920 showed a rate of nearly 100 per cent among the laboring population, a scheme of practical operations for the Presidency has been approved, Government supplying all necessary funds save the salary and traveling expenses of the director. In the face of a sharp economic crisis in Ceylon operations are continuing, although on a diminished scale. A proposed revision of the sanitary law is indication of an interest in a more aggressive public health policy for the colony.

In Siam the National Red Cross is taking a leading part in the fight against hookworm disease. Government has enlisted the army, the navy, the gendarmerie, and the local chiefs. For more than a year the dispensaries have been treating on the average more than 1,000 persons per week; and an active propaganda has created a demand that the service be made national in scope. Plans are now under consideration for putting the medical school at Bangkok on a modern basis as a necessary first step toward the training of Siamese for public health work.

The five-year scheme entered into with Australia in 1918 is now being operated under the new Commonwealth Ministry of Health which was created last year. The services of Dr. W. A. Sawyer, the Board's representative, are being lent to the Ministry for a limited time; Dr. A. J. Lanza has gone out to organize a division of industrial hygiene; Mr. F. F. Longley is to set up a division of sanitary engineering; and Dr. F. F. Russell, of the Board's staff, is to make a brief visit toward the end of 1922 to aid



Fig. 34.—Carrying the gospel of sanitation to the natives of Solomon Islands. Plantation group assembled for lecture on hookworm disease at Rendova



Fig. 35.—Group of Moors assembled at village dispensary to be treated for hookworm disease. After witnessing the results of five years' demonstration work among the Tamil estate population, large numbers of Moors are now voluntarily applying for treatment

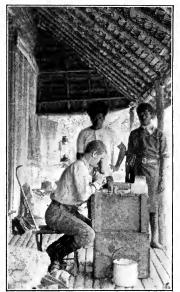






Fig. 36. Three phases of field operations against hookworm disease in Papua. *Upper left:* medical officer examining fecal specimen for hookworm eggs, Yule Island; *upper right:* native assistant in uniform of hookworm campaign staff; *below:* group of natives assembled to hear lecture, Sabuia

in the planning of a system of public health laboratories. In the meantime young Australians are being trained for these positions.

Just at the close of the year comes a call from the Philippines. In response to Government request the Board has undertaken to lend the services of Dr. Heiser, Director of its work for the East, for a period of three months; to provide a competent woman to aid in developing a public health nursing service for the Islands; to provide, for two years, a trained director for the public health laboratory in connection with the Bureau of Science; to detail a specialist to carry out a malaria survey; and to provide by means of fellowships for training a limited number of Filipinos in public health.

On Their Own Initiative

The year has brought reports of government and voluntary effort against hookworm disease in which the Board has not shared. Reference has been made in previous reports to the admirable work done in Assam under the direction of Colonel Sir Clayton Lane and to the eminent achievements of Schüffner and his colleagues in Sumatra. Paraguay took up the task two or three years ago; and now the Egyptian government is resuming operations which had been suspended during the war. Dr. Gann, Principal

Medical Officer of British Honduras, has completed a campaign extending over a period of three years and covering systematically the infected areas of the country. The infected have been treated; latrines have been provided, and the people have been taught to use them. It is now proposed to make the results permanent by a system of sanitary inspection. The report from British Honduras forces upon the reader the thought that if government medical officers everywhere had the public health point of view and something of Dr. Gann's aggressive energy, many of the cases of illness that are being treated in expensive hospitals would not occur.

Greater Speed and Economy in Field Operations

Results of the studies by Darling and Smillie in the administration of treatment for hookworm disease, and the more recent resurveys based on worm counts made by Smillie in Brazil, suggest important modifications in field procedures.

The findings of Smillie in Brazil and of Cort and Payne in Trinidad, for example, put beyond further question the value of mass treatment even when considered merely as a prophylactic measure. It is now known that by administering two standard doses of oil of chenopodium as a routine measure about 95 per cent of the parasites harbored by the people of a

community may be expelled. To attempt to get rid of the remaining 5 per cent by following each case to a complete cure would double the cost. By leaving this small fraction of infection—which is not of great clinical importance—to be taken care of by sanitation, it has been found possible greatly to reduce the cost and increase the speed of field operations. A preliminary comparative test in Brazil indicates a saving by this modification of about 50 per cent in per capita cost.¹

Field Studies in Hookworm Control

Reference has been made above to two or three studies that have been extremely fruitful in practical results. In this field 1921 has been the most productive year in the history of the Board. Colonel Sir Clayton Lane, with a small subvention, has been seeking to improve the technique of stool examination. Beta-naphthol has been given a further test as an anthelmintic on an extensive scale and under field conditions by Mhaskar and Kendrick in India. Ascaridol has been administered on a relatively small scale and with good results by Smillie in Brazil, Mhaskar²

¹ For details of working plan suggested by Dr. Smillie see pages 180 and 181 of this report; and Dr. Smillie's article "The Result of Hookworm Disease Prophylaxis in Brazil"; published in *The American Journal of Hygiene*, January, 1922 (v. 2, No. 1, p. 77-95).

² Working under the Indian Research Fund.

in India, and Molloy in Nicaragua. The administration of chenopodium without preliminary purge has been further tested under field conditions in Australia, Costa Rica, Panama, Salvador, and Colombia. The practice is becoming general. Dr. Washburn in Jamaica reports continued satisfactory results from the use of compound jalap powder. The most interesting contribution in the field of treatment is by Dr. M. C. Hall 1 of the Department of Agriculture, Washington, D. C., in administering carbon tetrachloride to dogs with 100 per cent efficiency for hookworms. The Willis salt-flotation method of stool examination has been tested on an extensive scale in the field and found to be efficient, rapid, and economical. Molloy of Nicaragua contributed an important improvement. Smillie finds that counting eggs on the slide as a means of estimating severity of infection, while serving as a rough indication when large groups are considered, is of small value in individual cases. Cort developed an improved apparatus for the recovery of hookworm larvae from the soil, and Smillie made an important contribution to the technique of differentiating hookworm and Strongyloides larvae. Dr. Caldwell, in Panama, completed a study of the relation of the action of sea-water on hookworm eggs and

¹ No connection with Board's staff.

larvae to the extremely light infection among the San Blas Indians living by the sea.

A small subvention by the Board made it possible for Dr. Cort, helminthologist in the Hopkins School of Hygiene, to go with a competent staff to Trinidad, British West Indies, for a series of field investigations covering a period of about four months. It proved to be an extremely fruitful expedition. The results, throwing muchneeded light on practical control operations, are being published in the form of ten papers appearing serially in the American Journal of Hygiene.¹

\mathbf{v}

Developing Schools of Hygiene

In the autumn of 1913, soon after the beginning of operations on an international scale, the Board faced the fact that in order to carry out the activities it had undertaken it must have a staff of trained hygienists; and that the countries in which it was proposed to encourage public health development must also have such men. The men even for the Board's own staff were not then available. Institutions for their proper training—that is, institutions covering broadly the whole field of hygiene, and equipped to culti-

¹ For a more detailed summary of the field studies referred to in this section, see appendix, pages 175 to 186.

vate it as a science and to train men in its application as an art—had to be developed. The outcome was a direct contribution to the Johns Hopkins University to establish the Hopkins School of Hygiene and Public Health. The school, now in its fourth year, enrolled during the year 1920–1921, 122 students.

Since 1917 the Board has been contributing toward the development on a very modest scale of an institute of hygiene in connection with the medical school at São Paulo, Brazil. This institute gives an undergraduate course in hygiene to the students in the medical school; conducts short training courses for public health officers; carries out epidemiological field studies for the state; and has done an extremely creditable amount of productive scientific work. During the year the Board pledged about 27,000,000 crowns toward the establishment of an institute of hygiene at Prague. This institute, under the Ministry of Health and in close relation to the University Medical School, is to combine a central public health laboratory for Czechoslovakia with a school of instruction for public health workers. As a result of conferences between the officers of the Board and the authorities of Harvard University and its medical school during the early months of the year, plans were matured and approved by which the Rockefeller Foundation agreed to contribute the sum of \$2,160,000 toward the further development of the Harvard School of Public Health. The resources now available are regarded as quite adequate for its immediate needs.

Fellowships in Hygiene and Public Health

In accordance with the policy illustrated in the foregoing section the Board contemplates contributing from time to time, as conditions may favor, toward the development of a limited number of schools of hygiene at strategic points throughout the world. As these institutions develop they will necessarily serve to stimulate and reinforce each other by interchange of experience, facilities, and men. The migration of students in the field of public health will then be feasible on a much more satisfactory scale than is possible under present conditions. In the meantime, however, the Board is taking advantage of the facilities now offered in England, the United States, and, by recent arrangement, in Canada, for the training of students from their own and other lands; and has provided by means of fellowships for a limited number of students to pursue courses in these countries. Fellowships have been granted to students who have been carefully selected with reference to their fitness for important posts as scientists, teachers, or practi-

cal administrators in the public health service, to which in most cases they have had definite assurance of appointment on completion of their courses. These fellowships are regarded as an investment in leadership. For the year 1921 fellowships were provided for fifty-four men and women from thirteen countries, as follows:

Brazil5	Czechoslovakia. 19	Nicaragua 2
Canada2	France 4	Poland 3
Ceylon1	Guatemala 1	Salvador 2
Colombia1	Mexico 1	United States.11
Costa Rica 2		

Extension Courses in Public Health

The well-established schools of hygiene will give short courses for health officers. Under most favorable conditions, however, only a very limited number can be expected to attend these institutions. Each state will find it necessary to provide practical courses for the better training of its own workers. Modest beginnings in this direction are being made in the form of training centers of limited scope, correspondence courses, and institutes. During the year the Board has contributed toward institutes for health officers in Georgia, Ohio, Michigan, and Alabama; toward three institutes for public health nurses in New York state; and toward the organization of a correspondence course to be conducted by the Ohio department of health for full-time county health officers in that state.



Fig. 37.—Counting hookworms expelled by treated patients. Field research conducted under the auspices of the Department of Hygiene of the São Paulo Medical School



Fig. 38.—Group assembled at typhoid exhibit at Prague. One of the earliest activities of the newly organized Ministry of Health of Czechoslovakia, with which the International Health Board is co-operating, was an educational campaign against this disease

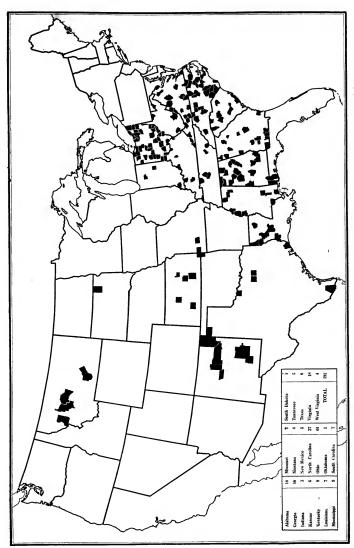


Fig. 39.—Counties having full-time health officers at close of 1921

VI

Promoting County Health Work

For reasons which are well understood public health effort has been centered mainly on the larger towns and cities. Health protection for the people living in country districts has been neglected. The tide is turning. The development of county health organization—which is now going forward with considerable momentum in the United States—is providing a service for the smaller towns and rural communities.

In the Southern States county health administration developed naturally and inevitably from the effort to control hookworm disease. This is a rural disease; its control is a problem in rural sanitation; a serious effort to handle this one problem in rural sanitation called into being county organization. County organization once established, control of hookworm disease became merely an item in a general health program under state and county administration. The demonstration thus given of the value of the county as a unit in the state scheme stimulated a movement which is becoming general. At the close of the year county programs on a full-time basis were in operation in about 192 counties in the United States (see map, page 148).

The Board and the United States Public Health Service are aiding this movement by contributing toward a limited number of demonstrations. The average county health budget is about \$10,000, and is provided from state and county funds. When the Board shares in a demonstration, it contributes toward a central budget or from \$1,000 to \$2,500 toward the county budget. During the year 1921 aid was thus given in sixteen states: Alabama, Florida, Georgia, Kansas, Kentucky, Louisiana, Maryland, Mississippi, Missouri, New Mexico, North Carolina, South Carolina, Tennessee, Texas, Virginia, West Virginia. A similar demonstration is being carried out in Czechoslovakia and in the state of São Paulo, Brazil.

Experiment in County Health Administration

The county program, which is essentially a scheme of rural public health work, is, for the United States, a new undertaking. It invites critical study and experiment. A joint arrangement has been entered into by the Hopkins School of Hygiene, the Maryland State Department of Health, the United States Public Health Service, and the International Health Board by which such an attempt is to be made. The arrangement provides for a full-time service in a county easily accessible to Baltimore and under

the immediate direction of a county health officer reporting to the head of the state service. Washington county has been selected for the purpose and is to contribute to the budget. The county is expected to serve as a field laboratory for the school, and to provide opportunity for investigation and for possible contribution to the development of a sound plan of health activities for rural communities. In so far as the undertaking succeeds it will serve as a demonstration and as a training base for students.

VII

Making Public Health Laboratories More Serviceable

A laboratory service — like vital statistics — is fundamental to intelligent public health administration. The trained health officer, however, understands that the provision of buildings, equipment, and scientifically trained men does not of itself provide the service he needs. Aggressive administration is equally necessary to make these facilities available to the people they are supposed to serve and to educate the doctors and people to use them. Under Dr. F. F. Russell, Director of Public Health Laboratory Service the Board has shared during the year in an increasing number of projects designed to promote this end.

Dr. Russell, while in Europe in connection with plans for the Institute of Hygiene at Prague, made brief visits for his own information to the public health laboratories at the three universities of Austria and some of the principal institutes of hygiene in France—at Nancy, Lyons, Montpellier, and Paris. These laboratories are doing a high order of technical work and are capable of doing a greater amount of it than is being required of them by the physicians of the regions they serve. Assistance was given in Alabama in adapting the state service to the larger opportunities opened up by a new and adequate laboratory building. Arrangement was made for the heads of the laboratory divisions in Alabama and Mississippi to visit the laboratories in other states and to observe the work of institutions where sera and vaccines are produced on a large scale. The state laboratories in Tennessee and West Virginia were visited for consultation regarding possible future developments. During the summer months Dr. Russell visited Panama, Central America, and Mexico. In Nicaragua arrangements were made for a diagnostic laboratory as part of the newly created national health service. In Salvador a national laboratory has been established under the department of health and is being organized by Dr. Segovia, who had been in

training for this purpose on a fellowship granted by the Board. In Guatemala a first step in the direction of a diagnostic laboratory has been made by adding to the equipment and staff of the central laboratory used in the hookworm work. In Mexico Government has plans for a national institute of hygiene. Here the Board has served as agent for Government in finding a suitable American to direct the enterprise for a limited period.

VIII

Establishing a Public Health Nursing Service in Brazil

During the latter part of 1920 the federal health service of Brazil became a national department of health with greatly enlarged powers and resources. The new department, with Dr. Carlos Chagas as its distinguished head, has undertaken among other things a nationwide program in rural sanitation to be carried out by joint arrangement with the states; and for the Federal District is setting up new divisions for child welfare, venereal disease control, and a crusade against tuberculosis. These activities have made acute the need of trained public health nurses. To meet the situation Government is establishing a training school in Rio de Janeiro. The Board has undertaken to assist in securing a

competent corps of American nurses to operate the field dispensaries and the training school for a period of three years. In the meantime a selected group of Brazilian women are to be trained with a view to taking over the responsibility. A limited number of dispensaries are in operation and plans have been completed for opening the training school early in the coming year. Arrangements have been made for recruiting the student nurses from the best graduates of the normal schools.

IX

Laying Foundations in Czechoslovakia

The Ministry of Health in Czechoslovakia, confronted with the task of creating a new service for the country, is showing great wisdom in undertaking the training of a staff of selected young men to develop and administer it. In accordance with plans matured in Prague in February, 1920, and approved by the International Health Board the following May, provision was made for a commission representing the Ministry to study public health administration in England and the United States. After the return of the commission early in the year 1921 the Ministry set up a committee to undertake a critical revision of its own plans and procedures. In the

general scheme which is being put into operation first consideration is being given to a few fundamentals: (1) a reporting and statistical service that shall provide the information which the Ministry and local health officers need for their daily guidance; (2) a public health laboratory service that shall make its facilities available to all the people of the country; (3) effective control of the ordinary communicable diseases; (4) provision of wholesome water supplies; (5) protection against contaminated milk; and (6) an institution for the adequate training of personnel. The Board at its meeting in May appropriated approximately 27,000,000 crowns toward the buildings and equipment of an institute of public health at Prague; and provided by means of fellowships for the training of twenty-two young Czechoslovaks for staff positions in this institute and for the administrative services outlined above.

Publications

During the year 1921 the following reports and publications were issued by the International Health Board:

Annual Report for the Year 1920.

Infant Mortality in New York City. By Ernst Christopher Meyer, Ph.D.

Staff members and others directly associated with projects in which the Board participated

made the following contributions to medical and public health literature, most of them in the form of articles published in medical journals that are widely circulated among persons interested in medical and public health topics:

Bass, C. C.

Diagnosis of the commoner intestinal parasitic infections. Southern Medical Journal, Nov., 1921, v. 14, p. 863-865.

Standard treatment for malaria. Public Health Reports, July 1, 1921, v. 36, p. 1502-1504.

The standard treatment for malaria—a discussion of some of its advantages. Southern Medical Journal, Apr., 1921, v. 14, p. 280-288.

CONNOR, M. E.

Fish as mosquito destroyers; an account of the part they played in the control of yellow fever at Guayaquil, Ecuador. *Natural History*, 1921, v. 21, p. 279–281. Same reprinted.

CORT, W. W.

Investigations on the control of hookworm disease; general introduction. *American Journal of Hygiene*, Sept.-Nov., 1921, v. 1, p. 557-568.

CORT, W. W., D. L. AUGUSTINE, AND G. C. PAYNE

Investigation on the activities of infective hookworm larvae in the soil; preliminary report. Journal of the American Medical Association, Dec. 24, 1921, v. 77, p. 2035–2036.

DARLING, S. T.

The tertian characters of quotidian aestivo-autumnal fever. American Journal of Tropical Medicine, Nov., 1921, v. 1, p. 397-408.

Darling, S. T. and W. G. Smillie

Studies on hookworm infection in Brazil; first paper. N. Y., Rockefeller Institute for Medical Research, 1921. (Monograph no. 14.)

Technic of chenopodium administration in hookworm disease. Journal of the American Medical Association, Feb. 12, 1921, v. 76, p. 419-420. Same reprinted.

FERRELL, J. A.

Careers in public health service. Journal of the American Medical Association, Feb. 19, 1921, v. 76, p. 489-492. Same reprinted.

Measures for increasing the supply of competent health officers. Journal of the American Medical Association, Aug. 13, 1921, v. 77, p. 513-516. Same reprinted. GREGG, ALAN

Inspecção sanitaria da Commissão Rockefeller no estadedo Paraná. Archivos paraenses de Medicina, Curityba, Jan., 1921, v. 1, p. 273-276.

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GUITERAS, JUAN

Observations on yellow fever in a recent visit to Africa. Sanidad y Beneficencia, Habana, Jan.-Mar., 1921, v. 25, p. 34-43.

HACKETT, L. W.

Os cinco annos da Commissão Rockefeller no Brasil. Boletim da Academia Nacional de Medicina, Rio de Janeiro, 1921, v. 93, p. 62-73.

HARRISON, A. P.

Oil field sanitation. Texas Municipalities, Sept.-Nov., 1921, v. 8, p. 108-111.

HEGNER, R. W. AND G. C. PAYNE

Surveys of the intestinal protozoa of man in health and disease. Scientific Monthly, Jan., 1921, p. 47-52. Same reprinted.

LAMBERT, S. M.

Intestinal parasites in North Queensland. Medical Journal of Australia, Apr. 23, 1921, p. 332-335. Same reprinted.

LEPRINCE, J. A.

Co-operative anti-malaria campaigns in the United States in 1920. Southern Medical Journal, Apr., 1921, v. 14, p. 297-306.

Noguchi, Hideyo

Prophylaxis and serum therapy of yellow fever. Journal of the American Medical Association, July 16, 1921, v. 77, p. 181-185.

Recent experimental studies on yellow fever. American Journal of Hygiene, Jan., 1921, v. 1, p. 118-129. Same reprinted.

Noguchi, Hideyo and I. J. Kligler

Experimental studies on yellow fever in northern Peru. *Journal of Experimental Medicine*, Feb. 1, 1921, v. 33, p. 239-252. Same reprinted.

Immunology of the Peruvian strains of Leptospira icteroides. Journal of Experimental Medicine, Feb. 1, 1921, v. 33, p. 253-260. Same reprinted.

Noguchi, Hideyo and Wenceslao Pareja

Prophylactic inoculation against yellow fever. Journal of the American Medical Association, Jan. 8, 1921, v. 76, p. 96-99.

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Hookworm in Australia. *Medical Journal of Australia*, Feb. 19, 1921, p. 148-150. Same reprinted.

Team work in sanitation. *Medical Journal of Australia*, Apr. 9, 1921, p. 285-287. Same reprinted.

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Modern medicine and the public health. Public Health Reports, Jan. 28, 1921, v. 36, p. 109-116.

Smillie, W. G.

Comparison of the number of hookworm ova in the stool with the actual number of hookworms harbored in the individual. *American Journal of Tropical Medicine*, Nov., 1921, v. 1, p. 389-395.

Souza, G. H. DE PAULA

Sanitary propaganda in Brazil. Bulletin of the Pan American Union, Apr., 1921, v. 52, p. 364-366.

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VAN DINE, D. L.

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VINCENT, G. E.

Passing of the country doctor. Forum, Oct., 1921. Reprinted with the title, Modern tendencies in medical education and practice.

World health and the Rockefeller Foundation. Nation's Health,

May, 1921, v. 3, p. 270-272.

WARREN, A. J.

General outline of a comprehensive plan of rural health work. Kansas State Board of Health, Bulletin, May, 1921, v. 17, p. 84-87.

WILLIAMS, L. R.

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Willis, H. H.

Simple levitation method for the detection of hookworm ova. *Medical Journal of Australia*, Oct. 29, 1921, p. 375-376. Same reprinted.

WYATT, B. L.

Review of the work of the medical bureau of the Commission for Prevention of Tuberculosis in France, July 9, 1917—Dec. 30, 1920. Paris, 1921.

APPENDIX

ACKNOWLEDGMENT

Extensive use has been made of the following special articles and reports in compiling the appendix, particularly the sections dealing with hookworm disease and malaria:

"Investigations on the control of hookworm disease," by W. W. Cort, D. L. Augustine, J. E. Ackert, F. K. Payne, and G. C. Payne. *The American Journal of Hygiene*, Baltimore, September-November, 1921, v. 1, Nos. 5 and 6; January, 1922, v. 2, No. 1; March, 1922, v. 2, No. 2.

"Anti-Hookworm Campaigns in Southern India," by J. F. Caius, K. S. Mhaskar, and J. F. Kendrick.

In manuscript.

"Report Covering Experiments in Malaria Control," by C. C. Bass. In manuscript.

In certain instances the authors' own words have been used. The Board is indebted to these as well as to many other members of the staff for contributions in the form of reports and articles which have made possible the following statement of findings and results.

APPENDIX

Ι

EXTENT AND SEVERITY OF HOOKWORM DISEASE

INVESTIGATIONS IN INDIA

Early in 1915 the Indian Research Fund Association decided to devote a share of its attention to the subject of hookworm infection in India. Its first inquiry, under the auspices of Colonel Sir Clayton Lane, was carried out in the tea gardens of the Darjeeling district during the winter months of 1915 and 1916. Later, or from October, 1916, to March, 1917, a similar inquiry was conducted among the coolies collected at the emigration depot at Negapatam. In April, 1917, the locale of the investigation was transferred to Dindigul (see map, page 162), and additional work was undertaken in Trichinopoly jail. The work in Dindigul was closed on May 24, 1919, and the staff moved to Trichinopoly, where, until December, 1921, they continued to devote themselves exclusively to investigations into the prevalence and severity of hookworm infection and the factors necessary for its control.

Inauguration of Control Operations. The early investigations having satisfied the authorities of Madras that the infection brought about much physical suffering and economic loss within the Presidency, Government determined to carry out an active campaign against the disease. Upon invitation the Board lent medical officers, in the beginning Dr. George P. Paul and later Dr. John F. Kendrick, to assist in the work, and on April 7, 1920, control operations were undertaken at the Cannanore jail. This piece of work was completed on June 26, 1920, and the following month examination and treatment were begun among the labor forces on the Wynaad-Nilgiri tea estates. Effort continued here until November 15, 1920, when control measures were inaugurated among the employes of the Buckingham and Carnatic mills in the city of Madras. In June, 1921, the staffs of Madras and Trichinopoly joined hands and carried out two experimental campaigns among coolies of the Mudis and Kalyanapandal tea estates in the Coimbatore district.

Prevalence of Infection in Madras Presidency. From the inception of the work in Negapatam in 1916 until the close of the year 1921, a total of 19,239 persons were examined: 16,743 in villages, towns, and rural areas, and on estates; and 2,496 in the city of Madras. In the areas exclusive of Madras city, 97.1 per cent of all persons exam-

ined were found to harbor hookworms; in Madras city, 63.6 per cent. Conditions extremely suitable for the development of the parasites and the spread of the disease were encountered practically everywhere: the country is tropical, and the vast majority of its inhabitants go barefoot, live away from sewerage, and work in the soil.

Severity of Infection in Madras Presidency. Although the investigations indicated that nearly everyone in the Presidency was infected, all classes and all walks of life were not infected to the same degree. Sweepers, or town scavengers, and ryots working in close contact with the soil were found to harbor six times as many worms as the police, and

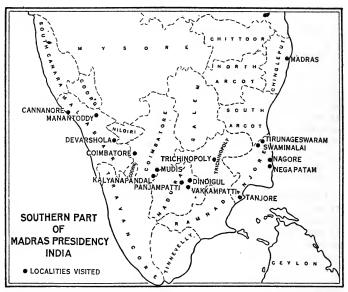


Fig. 40.—Localities visited in investigation into the incidence and effects of hookworm disease in Madras Presidency, India

twelve times as many as the classes who spend most of their time indoors. Among most classes the infection seldom produces severe symptoms, as the parasites are relatively few in number and nearly always the less harmful Necators. It is chiefly to estate laborers that the infection brings an appreciable diminution in health and energy. Since, however, the laboring classes, which are most severely infected, make up the bulk of the population, the country must suffer in the aggregate an enormous economic loss from the effects of the disease.

The following paragraphs give a brief résumé of the findings in the different localities investigated:

a. Inquiry at Negapatam. Of the total of 8,969 persons examined in the investigations conducted at Negapatam, 98.6 per cent of the coolies in the emigration depot were found infected and 91.0 per cent of the people in the town. Since the coolies examined were drawn from thirteen districts and four states of the Madras Presidency, and since the infection was found as often among those who had never before left the country as among those who were emigrating for the second or third time, the results demonstrated hookworm disease to be endemic in India. They suggested also that the infection was universally prevalent in rural areas of the Trichinopoly, Tanjore, Malabar, Madura, and South Arcot districts (see map, Fig. 40, page 162).

The infection occurred in all classes of people examined, irrespective of locality, caste, age, sex, or occupation, yet it was noted that ova were found more readily in specimens from the depot and village population than in those from residents of the town. Sixty-two per cent of the coolies examined at the depot, practically all of whom harbored hookworms but who nevertheless constituted a selected group, were in apparent good health and an additional 35 per cent in fair health. Not more than 3 per cent were visibly affected. Among the children of the town, however, the presence of hookworm infection was unquestionably responsible for much ill health, anemia, and retardation of physical development.

b. Swamimalai-Tirunageswaram. These two typical villages in the Tanjore district were selected for investigation in the hope of gaining some insight into the incidence of the infection among the village population of India. All of the 239 persons examined in the two towns were found infected, irrespective of sex, age, or apparent state of health. The physical condition of the coolie population as a whole was poorer than that at Negapatam. Again the school children showed marked debility

and general retardation.

c. Dindigul. Dindigul town and the few neighboring villages were next chosen for observation. Of 412 persons microscopically examined, including sweepers, police constables, factory hands, school children, and patients in hospital, 100 per cent were found infected. Seventy-nine sweepers harbored an average of 127 worms per case; fifty-two police, an average of twenty-one; twenty-one persons of the upper and middle classes, an average of eleven. On the whole the infection was light; in the main the worms were of the species Necator.

d. Vakkampatti-Panjampatti. Examination of 250 fecal specimens in these two villages, located five miles from Dindigul, again showed 100 per cent infection of a degree that, though still mild, was decidedly

heavier than in the town.

e. Trichinopoly jail. Of convicts who had resided in the southern part of Madras Presidency, ninety-seven of every 100 examined were found infected. The severity of the infection varied widely according to districts, the average number of worms harbored ranging from 6.2 to 102.8. For ten selected districts the average complement of worms harbored was sixty-two. Here again the worms were mainly of the species Necator.

No clear relationship was discovered between the hemoglobin index and the number of hookworms harbored, and no justification for classification into light, mild, and severe cases on the basis of degree of anemia. Treatment which resulted in complete elimination of the parasites raised the hemoglobin index only two-tenths of a point, or from an average of

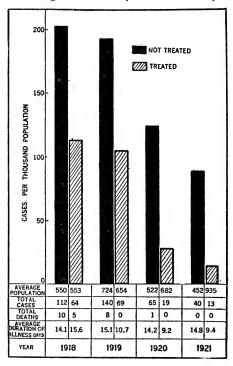


Fig. 41.—Incidence of bowel complaints, Trichinopoly jail, India, 1918 to 1921, inclusive. Among prisoners who had not been treated for hookworm disease, sickness and deaths from bowel complaints were much more frequent than among those who had been treated

74.6 to 74.8. It was, however, shown fairly conclusively that freedom from hookworm disease diminished the susceptibility to bowel complaints and influenza, shortened the period of illness from these diseases. lowered the death rate (see Fig. 41). There was, moreover, in the matter of gain in weight, a slight difference in favor of treated cases, 72.2 per cent of them showing a gain as compared with 66.3 per cent of untreated cases.

Study of the records 1.878 prisoners brought out the interesting fact that while the incidence of hookworm infection is not appreciably affected by jail life even under sanitary conditions, a natural progressive elimination of worms takes place that does very markedly affect the intensity of the disease. Thus, an average infection of fifty-

eight worms on admission fell to forty-eight among inmates of a month and to thirty-two, twenty-nine, and seventeen worms, respectively, among inmates of three, twelve, and eighteen months. After eighteen months the average number of hookworms per case, though low, remained nevertheless fairly constant, even so long a stay as seventeen years failing to bring elimination of all the worms.

f. Coimbatore jail. During an interval in the work in Trichinopoly jail brought about by an epidemic of cholera, the stools of 463 prisoners in the Coimbatore jail were examined for hookworm ova and the hemoglobin indices determined in 300 cases. The rate of hookworm infection was 87.5 per cent; the average hemoglobin index, 72.4. The few figures collected showed again that a prolonged stay under the sanitary regimen of jail life brought down the intensity of hookworm in-

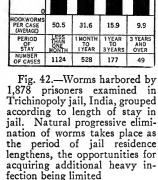
fection but in no case eliminated it. There was no opportunity, however, as at Trichinopoly, for investigating the effect of treatment in improving the physical condition of the

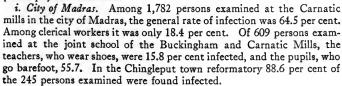
convicts.

g. Cannanore jail. Microscopic examination of the 964 inmates of Cannanore jail, drawn mostly from the wet districts of Malabar and South Canara, revealed a rate of infection of 89.7 per cent. The incidence among new arrivals is probably nearer 99 per cent, for examination of 197 specimens obtained from persons lately admitted to the jail showed ova in 196, or 99.5 per cent. Only a few cases presented clinical manifestations of severe or even moderately severe hookworm infection. The large number of infected convicts were freed of their worms in a short time by a small staff administering systematic treatment.

h. Manantoddy-Devarshola. On these estates examination of about 2,300 coolies gathered from diverse parts of the Presidency showed 100 per cent hookworm infection among coolies from wet districts and 83 per cent among those from dry. Hemoglobin estimations made on 200 of the coolies revealed an index of 60.0. Most of these estate coolies were in

pitiful physical condition.





 of hookworms harbored.

Signs of severe hookworm disease were seldom seen at the mills; only seventeen cases of profound anemia were observed, and these improved rapidly under treatment. Sanitary latrines, provided in sufficient numbers and in convenient places at the mills, are unquestionably a factor in keeping down the infection. Elsewhere in the city of Madras gross soil pollution occurs, especially around the huts and tenements. In a section of the city containing several hundred one-room tenements, inspection disclosed only one latrine.

j. Mudis tea estates. On this group of five tea estates, located seventy miles south of Coimbatore, microscopic examination of 794 coolies, for the most part recruited from the plains of Madras Presidency, revealed 91.6 per cent infected; examination by treatment and recovery of worms revealed 100 per cent infected. The number of worms harbored by seventy-four coolies whose worms were saved after treatment ranged by provinces from 21.5 to 205.7 per person, an average of 92.9 (see Fig. 45, page 170). Hemoglobin estimates on 1,558 coolies revealed an average index of 74.8, with 10 per cent of the cases lower than 50. Here again no correlation was found between the hemoglobin index and the number

INCIDENCE IN AUSTRALIAN TERRITORY

By the end of the year 1921 all of the projects contemplated in the original plan for the control of hookworm disease in Australia, embracing surveys or control operations in every Australian state and in the three territories, were under way. Surveys were completed during 1920 or 1921 in Tasmania, in New South Wales, in Victoria, in the British Solomon Islands adjacent to Papua, and in additional areas in the state of Queensland. Results to date indicate that Western Australia as well as an area in Northern Territory centering in Darwin is entirely free of hookworm infection.

Victoria and Tasmania. In the survey of the state of Victoria no hookworms were found among the 1,629 persons examined. The mines were as free of infection as the surface, where climatic conditions, particularly lack of rain, are unfavorable to the development of larvae. In Tasmania 2,209 fecal examinations revealed only two cases of hookworm infection, both in persons who had arrived from Fiji during the preceding seven months. The general climatic conditions of this state also are considered unfavorable to the development of hookworm larvae.

State of Queensland. During the year 1921 surveys were completed in nine areas, including the Cloncurry-Hughenden, Longreach-Emerald, and Charleville-Dalby districts, which cover about 500,000 square miles and embrace most of the interior of Queensland.

Examination of 2,120 persons in the Cloncurry-Hughenden area showed only fourteen, or 0.66 per cent, infected, and all of these fourteen had received their infection in other regions. The conditions here with respect to rainfall are particularly unfavorable for the development and





Fig. 43.—Ancient temples in Siam put at service of hookworm commission as headquarters for meetings and distribution of literature. Educational activities are an essential feature of the world-wide crusade against hookworm disease



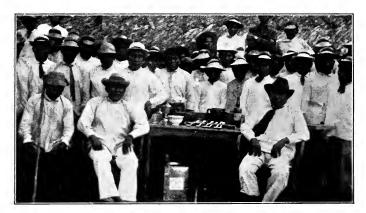


Fig. 44.—Groups of natives assembled for treatment, Tupile, Panama. Hookworm campaigns afford an excellent means of instructing primitive peoples in the rudiments of sanitation

spread of the disease. In fact, the whole area would seem to be definitely non-infectible.

In the Longreach-Emerald area examination of 759 children at selected state schools revealed nine cases of hookworm disease, or a percentage of 1.2. The low rainfall, producing dry soil conditions which interfere with the development of the larvae, and the large tracts of land held for pasture, with only an insignificant acreage under cultivation, are believed to be responsible for the low incidence. The survey demonstrated that the disease is almost certainly absent from the surface; the coal mines near Clermont, however, were not investigated.

In the Charleville-Dalby area 535 school children were examined and none were found infected. Here again low rainfall was chiefly re-

sponsible for the absence of indigenous hookworm disease.

Investigations were also carried out in a small area of fifty-nine square miles centering in the city of Rockhampton, Queensland. In this survey 4,931 persons were examined and only 1.03 per cent found to be infected—a rate too low to call for control operations. The low incidence in the Rockhampton district is explained by the fact that the city has an effective system of night soil disposal, while the district as a whole has little rainfall and but a small proportion of its total area under cultivation. The natives of Hammond Island, near Thursday Island, were examined and found, owing to their habit of living on the beach, to be entirely free of hookworm infection. In an area including Brisbane and vicinity the rate of infection recorded was only 1.4 per cent, and worm counts revealed the average severity also to be low. Only one small region in the state of Queensland remains to be visited by the survey staff—an area with a small population located at the southern end of the gulf of Carpentaria.

Papua. The territory of Papua, surveyed in 1917 by Dr. J. H. Waite, was again surveyed in 1920 by Dr. S. M. Lambert. The investigation, covering the seven months from May 14 to December 15, disclosed a high rate of hookworm infection as far as the survey staff was

able to penetrate the country.

The total population of the 821 villages under government control is estimated at 50,000 and in addition there are 7,000 indentured laborers in the colony. The entire population, with the exception of a few whites, consists of native Papuans. The staff examined 6,141 indentured and 633 casual laborers on sixty plantations; 10,372 natives in 166 villages; and 759 natives in nine mission schools. On the plantations the rate of infection was 65.8; in the villages, 54.9; at the mission schools, 59.7. Among the ninety-two white residents examined, only 17 per cent infection was recorded.

There was little difference in the rate or the severity of infection between the villages and the plantations: the average village rate of infection was only 11 points lower than the average plantation rate. Grouped geographically the plantation rates ranged from 62.2 to 84.5 per cent, being highest in the Delta division, where rainfall and temperature are high and there is gross soil pollution. The village rates ranged

from 33.5 to 79.7 per cent. Marked contrast existed between the infection rates of villages in the dry and wet regions, the average being 13.1 for the dry and 70.9 for the wet.

Hemoglobin estimates on 2,891 infected and 835 non-infected natives showed the average index of the infected group to be 55.7 as compared with 63.5 for the non-infected. The low hemoglobin index of the

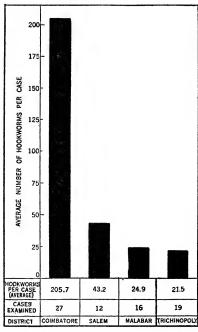


Fig. 45.—Average number of worms harbored by seventy-four coolies at work on the Mudis tea estates, Madras Presidency, India, grouped according to the coolies' districts of origin. Those from Coimbatore were almost entirely of the uncleanly Panchama class

non-infected group is believed to be due in the main to malaria, a disease with which practically all Papuans are infected. Clinical hookworm disease existed in only 5 to 10 per cent of the natives examined. Estate managers report that marked benefits in health and strength have resulted from the course of treatment administered as a feature of the survey.

INVESTIGATION IN CHANGWAT LAM-PANG, SIAM

Under the new plan of organization adopted for Siam, survey units, operating from strategic centers, are starting out to cover the country in an effort to ascertain the prevalence and severity of hookworm infection and to assist the local authorities in developing among the people a sanitary sense. One such survey—that in the changwat Lampang, mondhol Maharat—was in progress from June

7 to September 9, 1921. Estimates based on the results of the survey indicate that approximately 200,000 of the 275,000 people living in the changwat harbor hookworms.

Examination of 4,038 persons revealed an infection rate of 75.0 per cent; in the four aumphurs in which examinations were made, the rates were 74, 71, 70, and 85 per cent. Among the general population the infection rate was 74.9; among school children 71.7; among

prisoners 73.9; among gendarmes 78.3; and among soldiers 78.2 per cent.

The infection was of a moderate degree of severity. From 355 cases whose stools were saved for seven hours after treatment, a total of 8,181 hookworms were obtained, or an average of twenty-three worms per

case. The largest number of worms expelled by any one person was 251. Hemoglobin determinations made on 503 school children gave, it is true, a low average index—74.5—but this was due to various contributing causes, including, in addition to hookworm, malaria and malnutrition.

CONTROL EFFORT IN BRITISH HONDURAS

An infection survey carried out in British Honduras from February 7 to May 24, 1916, under the direction of Dr. L. W. Hackett, who was lent for the purpose by the Board, awakened considerable interest among the people, and on September 15, 1917, systematic examination and treatment were begun. Through courtesy of Government the Board has received a copy of the report of the campaign, prepared by Thomas Gann, the medical officer in charge, showing results accomplished up to May, 1921.

Approximately 15,000 of the colony's total population of 40,458 live in localities where the infection is so low as not to necessitate treatment. Of the remaining population, practically four-fifths have been reached by the treatment staff. Resurveys made

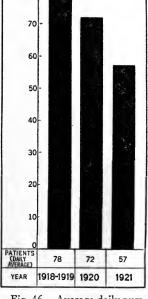


Fig. 46.—Average daily number of patients in Lionel Town hospital, Vere area, Jamaica, 1918–1921, inclusive. Following the anti-hookworm campaign in this area in 1920 there was a significant reduction in hospital cases

during 1920 of districts whose inhabitants were treated two or more years previously, show substantial reduction in the incidence of infection.

The excellent results accomplished toward stamping out the disease are due in no small degree to the stress that has been laid on soil sanitation. From the beginning police and health authorities have insisted upon the provision of suitable latrine accommodation, until it may be said that at present nearly every place in the colony is provided with adequate sanitary latrines. The exceptions are certain remote

Carib and Indian villages, some small settlements of a few houses each, and lumber and other camps composed, usually, of only temporary habitations.

SURVEYS IN MISCELLANEOUS AREAS

Upon resumption of the campaign in **Dutch Guiana**, investigation in the area selected for initial control operations showed 92.2 per cent

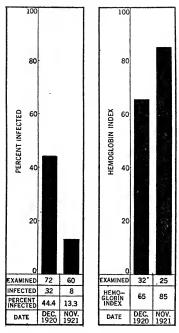


Fig. 47.—Effect of hookworm treatment administered in the Rio Cobre Home, Jamaica. The incidence of hookworm infection among the inmates was reduced and the hemoglobin index raised

infection. A complement of from 300 to 400 worms was not unusual; two persons after a single treatment expelled more than 1.300 worms. From the republic of Colombia high rates of infection continue to be reported, the average for the areas embraced within the control program of the year being 92 per cent. In Quebradillas, the first area to be worked under the new plan of control approved for Porto Rico, an infection rate of 86.2 per cent was recorded among the 7,107 persons examined. Many severe cases were noted, though worm counts and hemoglobin estimations do not reveal a very severe general infection. In Jamaica an average infection rate of 39 per cent is reported for the districts worked during the years 1920 and 1921. In this colony a striking difference is reported in the infection rates for wet and dry districts, the average being 85 per cent for the former and only 10 per cent for the latter. The infection rate for the British Solomon Islands, just surveyed, is reported as 24.7.

BENEFITS OF HOOKWORM TREATMENT

Improvement in Health and Physical Condition, Jamaica

Statistics for the Lionel Town hospital in Jamaica, an institution which serves the estates and villages of the Vere area, where operations for the control of hookworm disease were carried out between November.

1919, and April, 1920, show that during 1918 and 1919 the average daily number of patients was seventy-eight, and during 1920, seventy-two. In 1921, following a campaign against hookworm disease in the area, it dropped to fifty-seven—a decrease in one year of 20.8 per cent (see Fig. 46, page 171). Before 1920 more than 80 per cent of the patients

admitted to the hospital were infected with hookworm disease, as compared with not more than 5 per cent during 1921.

At another institution in Jamaica, the Rio Cobre Home, thirty-two children out of the seventy-two examined in December, 1920, had hookworm disease; in November, 1921, following a campaign against the disease in which all infected children received treatment, only eleven out of sixty examined were found to be infected. Meanwhile the average hemoglobin of all children in the institution had risen from 65 to 85, an increase of 30.8 per cent (see Fig. 47, page 172), and the average weight had increased from 46.5 to 51.6 pounds, or 11.0 per Twenty-five of the children examined in 1921 were among the group of thirty-two who were cured of hookworm disease a year before. and eight of them were found to have been re-infected-a re-infection rate of 32 per cent.

Increased Efficiency of Sumatran Laborers

Recent official government correspondence from Mauritius calls attention to the fact that by means of control measures in Sumatra during the period from 1906 to 1918 the proportion of first-class coolies (those

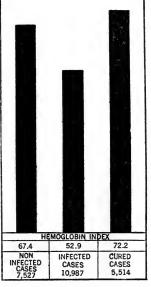


Fig. 48.—Hemoglobin indices of 18,514 persons in Costa Rica. Compare index of the group not infected with hookworm disease with that of the infected persons before treatment as well as after cure. In this country increased appetite, blood regeneration, and improved health promptly followed treatment for hookworm disease

not infected, or only lightly infected, with hookworms) rose from 35 to 90 per cent, while that of moderately infected coolies fell from 50 to 10 and that of severely infected from 15 to 0.5 per cent. The number of badly infected coolies on insanitary estates in this colony averaged ten; on sanitary estates, three. The sanitary estates showed 1.8 per cent of coolies sick; the insanitary, 3 per cent.

Three estates in Sumatra which, in spite of all recommendations,

refused to adopt hookworm control measures, had in the course of two and one half years 4,657 admissions to hospital. Three other estates with a laboring force of the same size which did adopt these measures had only 1,034 admissions—a difference of 78 per cent. One hospital admission represented on the average twenty-two days of treatment, which, reckoned at fifty cents a day, meant an aggregate loss of no less than 40,000 guilders during a period of only two and one half years.

LIFE OF HOOKWORM EGGS AND LARVAE IN THE SOIL

The department of medical zoology of the School of Hygiene and Public Health of the Johns Hopkins University dispatched to the island of Trinidad, British West Indies, during the summer of 1921, an expedition to study the life of hookworm eggs and larvae in the soil. The expedition was under the direction of Dr. William W. Cort of Johns Hopkins University and was aided by a subvention from the Board. Those who took part in the investigation included Dr. James E. Ackert of the Kansas State Agricultural College, Mr. Donald L. Augustine of Johns Hopkins University, Dr. George C. Payne, the Board's director in Trinidad, and his wife, Dr. Florence King Payne. The party from the United States sailed from New York May 5 and returned September 17. The work was conducted with the active co-operation of the Government ancylostomiasis commission and was carried out at Princes Town, in the south central part of the island in an area where sugar-cane cultivation predominates and over 70 per cent of the people are hookworm infected.

Finding of Unsheathed Hookworm Larvae in the Soil. Although various investigators have reported that under certain conditions mature hookworm larvae may lose their sheaths while still living in the soil, the general opinion has prevailed that they normally pass this period of their existence enclosed in sheaths and complete their second larval molt only when penetrating the human skin. Both field and laboratory studies in Trinidad showed, however, that it is a common occurrence for mature hookworm larvae to lose their sheaths while continuing to live in the soil. The loss of sheath, moreover, did not render the larvae non-infective.

Of a total of 4,265 mature larvae isolated from a series of 108 positive soil samples taken from an area of a sugar-cane field heavily polluted by individuals infected with hookworms, only 42 per cent were enclosed within the protective sheath. The finding was further supported by the studies of conditions under which hookworm eggs hatch and develop and of the migration of infective larvae, both of which showed that a proportion of the larvae became unsheathed while in the soil. The discovery will doubtless call for a revision of many former ideas that have resulted from a study of sheathed forms.

Length of Life of Larvae in the Soil. The discovery that so large a proportion of the larvae shed their skins while still living in the soil introduces a new factor for consideration in determining the length of larval life. Under favorable conditions this molting was not found to shorten the life of the larvae, although in unfavorable environments it

did seem to decrease somewhat their chances of survival. Tropical temperature and other environmental conditions which tend to increase the activity of the mature hookworm larvae were found to shorten their lives through the more rapid using-up of the stored food material.

The Trinidad investigations showed that the life of larvae in the soil seldom exceeds six or seven weeks. Heretofore it had been believed that under favorable conditions of temperature and moisture they lived for months or even years. In the cane-field area, where there was intense soil infestation, the number of larvae was reduced more than 90 per cent within three weeks after soil pollution was stopped, only a very few larvae being left at the end of six weeks. Laboratory experiments with different soils under different conditions showed, too, a great reduction in the number of larvae in two or three weeks and an almost complete dying out in six weeks.

Relation of Chickens to Spread of Hookworm Disease. So far as Trinidad at least is concerned the expedition reported that chickens help to limit rather than to spread the disease. The great majority of hookworm eggs ingested by chickens failed to produce infective hookworm larvae after passing through the chickens' alimentary tracts, the failure being attributed in part to the breaking of eggs in the gizzards, to injury from urine in the chicken feces, and to malnutrition of the larvae. Although chickens that have swallowed hookworm eggs day after day may establish dangerous infective spots around drinking receptacles; although they may carry eggs and larvae from places unfavorable for their development and deposit them in favorable environments; and although they may transport to dooryards and other places traversed by barefooted persons human stools voided in out-of-the-way localities, the reduction of mature hookworm larvae brought about by the fowls was nevertheless found to be more than sufficient to offset the establishment of these additional infective spots.

Relation of Pigs to Spread of Hookworm Disease. The discovery of a new species of hookworm (Necator suillus) as being of common occurrence in the domestic pigs of Trinidad marked the study of the rôle played by pigs in disseminating the infection. The investigation showed, moreover, that the pig, ranging freely, is an important factor in the spread of hookworm infection. A high percentage of human hookworm eggs ingested by pigs were found to produce infective larvae, the hatching, during the rainy season in Trinidad, usually occurring within five days.

Effect of Hookworm Control Measures. To determine the sources of human infection and to learn the effect of a control campaign on soil pollution, on soil infestation, and on human infection, an intensive epidemiologic study was made of an area in a sugar estate. Of 146 East Indians and negroes living in the area chosen for study, 117, or 82.4 per cent, were found to be infected with hookworms. A series of three treatments greatly decreased the proportion of persons infected as well as the total number of worms harbored,



Fig. 49.—Group assembled to hear lecture and receive treatment for hookworm disease, Fusagasugá, Colombia



Fig. 50.—Exhibit on hookworm disease at the National Agricultural Exposition, Brisbane, Australia



Fig. 51.—Negro family, residents of Federal District, Brazil. All except mother treated in 1919 for hookworm disease. Mother first treated in 1921, expelled 123 hookworms; other members of family, re-treated in 1921, expelled average of six worms

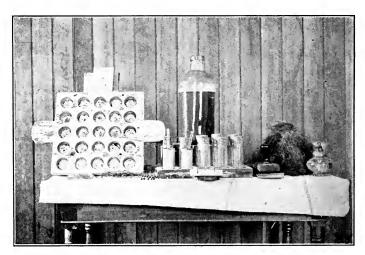


Fig. 52.—Examining board and other apparatus used in Jamaica in examining fecal specimens by the salt-flotation process. Great speed, accuracy, and economy are resulting from this and other improved methods of diagnosis

First inspection showed soil pollution in the area to be widespread and gross, though concentrated at certain easily accessible places in the cane fields near the barracks. Soil samples showed little soil infestation except along the heavily polluted strip of cane. The building of adequate latrines and the carrying on of an educational campaign effected great reduction in pollution in the cane field. A series of soil samples taken at intervals showed a rapid dying out of infective hookworm larvae, so that in about six weeks soil infestation was practically eliminated.

Examination of soil samples indicated that even if moisture was present, conditions on the clay loam soil were not favorable for the development of hookworm larvae unless there was considerable protection, especially by vegetation; and an analysis of the habits of the people in relation to the distribution of soil infestation suggested that most of the heavy infection was due to the practice of defecating at selected places in the cane field. The localized character of soil infestation, especially in the cane field, showed that there was little migration of infective larvae, although there was evidence that the larvae could be carried considerable distances by water.

Epidemiologic Study on Cacao Estate. Examination of the people living in three houses on a cacao estate showed a heavy infection with hookworms. As in the case of the sugar estate, pollution of the soil was confined almost entirely to definite spots, "natural latrines," in the cacao grove near the barracks. Here, again, examination of soil samples demonstrated that the larvae did not migrate and that almost all the human infection was derived from visits to the natural latrines. Even in this grossly polluted strip of soil, however, the findings were somewhat irregular, indicating that conditions were not always favorable for the larvae to develop. Six weeks after three routine treatments had been given, soil samples taken from the former heavily polluted spots showed marked reduction of soil infestation.

Migration of Larvae in Soil. Studies of migration showed definitely that hookworm larvae do not move from their original place of development unless carried away by the action of water or on the feet of man or one of the domestic fowls or animals. Larvae placed on moist soils did not migrate in periods of from fifteen hours to forty-two days. Not only did they not migrate even when their environment became unfavorable, but in the course of the experiment there was, through the dying out of the larvae, striking reduction in their numbers, the rate of reduction increasing with the passage of days.

Position of Larvae in the Soil. Infective hookworm larvae under the most favorable conditions of moisture and temperature were found to remain on or near the surface of the soil. They crept up pieces of wood, decaying vegetation, and other objects only as far as a film of moisture extended. They were not found within drops of water collected in the axils of leaves or green plants, nor upon the leaves themselves. At the centers of soil infestation they were found on the leaves or twigs

when the latter were moist. When the leaves or twigs were dry, the larvae retreated to the underlying soil.

GREATER SPEED AND ECONOMY IN FIELD OPERATIONS

The demonstration by Cort and his associates that the life of hookworm larvae in the soil is much shorter than had been commonly supposed; that the larvae do not migrate; and the earlier demonstration by Smillie that hookworms are slowly acquired and slowly lost, find complete confirmation in the results of the 1921 resurveys of Governor's Island and Jacarepagua, Brazil (see pages 127 to 129). Not only do these findings abundantly confirm the fundamental soundness of the working methods that have been employed to effect the control of hookworm disease, but they indicate the lines to be pursued in future efforts to secure greater speed. economy, and efficiency in field operations. With the data now at hand it is possible to formulate a simplified plan of procedure based, not on removing the last hookworm from every infected individual, but on keeping reduced to a point at which they do no serious harm to the individual or to the community, the number of worms harbored. A paper recently published by Dr. Smillie gives the details of a method he has evolved to meet this end.1

Plan of Control for Heavily Infected Areas. In communities where almost all the people are soil workers—poor, ignorant, barefoot, spending ten or twelve hours daily in the fields, and subjected to all the factors that tend toward heavy infection—Dr. Smillie recommends a preliminary treatment campaign in which three treatments of a standard remedy would be given to all workers in the soil. Simultaneously the attempt would be made to secure the installation of latrines at not less than three fourths of the houses. After this proportion of the homes had sanitary latrines a second treatment campaign would follow. In the second campaign every positive case would receive only one treatment, and special effort would be made to treat all who work in the soil. Following this, a small staff would be stationed permanently in the community to secure the continued construction and maintenance of latrines, to treat newcomers, and to serve as the basis for a future rural health unit.

Plan for Lightly Infected Areas. In communities whose inhabitants generally are in better circumstances, accustomed to a better mode of living, and less severely infected, he recommends treating twice all positive cases except soil workers, whom he would treat three times, and at the same time inaugurating a campaign of latrine construction. Upon completion of treatment a small staff, who would remain to continue the work of latrine construction and to treat newcomers, would devote certain days of each week to general dispensary work, when they would treat any hookworm infected persons who came to the clinic. Here, again, the small unit would serve as the basis for extending perma-

¹ The Results of Hookworm Disease Prophylaxis in Brazil, by Wilson G. Smillie. The American Journal of Hygiene, January, 1922, v. 2, No. 1, pp. 91-94. Same reprinted.

nent rural sanitary activities throughout the community. While hookworm infection would not be eradicated by either of these plans, hookworm disease would be adequately controlled if latrines were constructed and faithfully maintained and used.

Mass Treatment in Absence of Latrine Provision. In communities whose inhabitants suffer with severe hookworm disease and who either cannot or will not build and use latrines, treatment is the only method of attack that can be used. The Brazilian experience shows that an individual who receives two standard treatments and is thus freed of practically all his hookworms, but who reverts to the conditions of living which produced his first infection, does not usually regain a large complement of worms until at least three years have elapsed. Under such circumstances it is therefore safe to follow the plan of giving all individuals a standard treatment once a year.

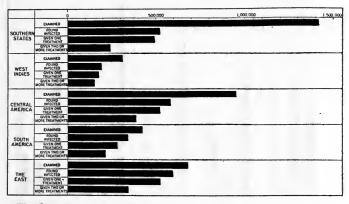


Fig. 53.—Number of persons examined and treated in world-wide campaign against hookworm disease, 1910–1921, inclusive, by main geographical divisions (for details, see Table 1, page 218.)

EFFECT OF SALT ON VIABILITY OF HOOKWORM EGGS AND LARVAE

A limited study of the effect of salt on the viability of hookworm eggs and larvae, carried out during 1921 by Dr. Fred C. Caldwell, director of hookworm control in Panama, showed that for all practical purposes sea water prevents the development of larvae. Particularly favorable conditions for the study were afforded by the habits of the San Blas Indians, who live on 227 islands stretched along 130 miles of coast and have the time-honored, inviolate custom of defecating in the sea. Non-Indian residents, however, frequently pollute the soil. In a number of localities

on three islands having the same climatic conditions, the average rate of infection among 595 Indians examined was only 4.7 per cent, as compared with the rate of 62.9 per cent among thirty-five non-Indian residents.

In the Spanish village of Puerto Obaldia on the San Blas coast, where soil pollution was general, every person examined was found infected. A large proportion of the non-Indian population of all three of the islands had lived for considerable periods in the city of Panama, a fact that is doubtless responsible for the rate of infection being lower among them than it would have been if they had spent their whole lives on the islands. All the infected Indians had either spent extended periods on the mainland or had lived in close association with Jamaicans or Colombians while engaged in the gathering of rubber.

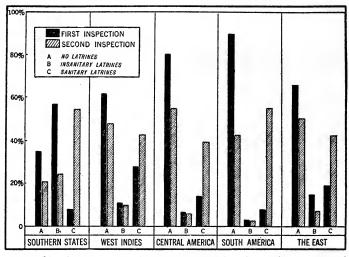


Fig. 54.—Sanitary conditions on first and last inspections compared for the five main geographical divisions of the world-wide campaign against hookworm disease, 1910–1921. In all regions extensive sanitary improvement has gone hand-in-hand with treatment

APPARATUS FOR RECOVERING HOOKWORM LARVAE FROM THE SOIL

The staff engaged in the investigations in Trinidad used with much success, in every phase of their work, a modification of the apparatus invented by Baermann for recovering larvae from the soil. It permitted determination to be made of the exact sources of infection through examination of large numbers of soil samples from various parts of areas in which hookworm disease was prevalent; it enabled the staff to follow

closely the reduction of soil infectivity that resulted from the elimination of soil pollution; and it made possible not only a careful study of the con ditions under which the eggs develop, but also of the extent of migration of the larvae, the rate of unsheathing, and the length of larval life in different kinds of soil.

The apparatus consists of a glass funnel almost filled with water and with the outlet closed by a clamped piece of rubber tubing. The soil sample is placed in a sieve so fitted into the funnel that the level of the water is above the lower surface of the soil, thus bringing the soil sample into contact with water of a considerably higher temperature than that of the soil. Under these conditions a large proportion of the nematodes pass from the sample into the water, where they can be collected and counted.

For examining soil samples of half a pint or more, large glass funnels eight inches in diameter, and specially prepared brass sieves seven inches in diameter, three inches deep, and with a one millimeter mesh, were used. To prevent small particles of soil sifting through into the funnels the sieves were lined with one or two thicknesses of cloth. It is possible to substitute for the sieve a piece of wire screen covered with cloth, of such a size that it can be fitted down into the funnel. The sieves have the advantage, however, of being more easily handled in changing samples of soil.

III

DIAGNOSIS OF HOOKWORM DISEASE

WILLIS SALT-FLOTATION TECHNIQUE

The Willis salt-flotation technique of stool examination found added favor in the work of the year. It is proving particularly valuable for detecting light infections usually missed by the less refined plain smear and centrifuge processes. In Salvador, for example, it increased by 10 to 15 per cent the number of specimens found positive with the aid of the centrifuge. In Ceylon 449 additional positives were found in a group of

1.569 specimens—an increase in efficiency of 28.6 per cent.

The process calls for adding to the feces a saturated solution of coarse table salt drop by drop until the container in which the specimen is received is filled to the brim. The mixture is thoroughly stirred and allowed to stand for a few minutes to permit the ova to rise. A clean polished slide is then placed on the container in contact with the surface of the fluid. In a short time the ova adhere to the slide, which is removed and examined with the microscope. The method is so simple, efficient, and economical that it is rapidly coming into use in all countries. Tests in Queensland showed that as compared with the brine flotation method the Willis technique had the advantage of being quicker; of requiring less apparatus, no steel wool and no wire loops being needed; of using less salt solution; and of permitting the discarding of the tins after use and so offering no possibility of ova being carried from one tin to another.

To facilitate examination by the Willis method Dr. Molloy, in Nicaragua, has improvised a special board which has proved effective in field work. The board—the end of a box in which gasoline is shipped—measures $13\frac{3}{4}$ by $9\frac{1}{2}$ inches, and is covered on one side with a piece of tin to facilitate washing. To this board are nailed, in two rows, the tops of ten containers. The specimen containers are placed in these tops before the salt solution is added. The board is of a convenient size to handle and is easily cleaned.

LANE LEVITATION METHOD

Colonel Sir Clayton Lane, who has been at work for several years seeking to develop a technique of stool examination that will combine the utmost simplicity with the greatest refinement, recommends a levitation process and stresses the advisability of using chemicals to preserve the stools and so permit their examination under more favorable circumstances than are usually found in the field. The fact that levitation may be applied as successfully in preserved as in fresh stools, if certain disin-

fectants are used, offers the hope that it may prove practicable to effect further economy and efficiency by dissociating diagnosis, in time and

place, from the other phases of hookworm work.

Dr. Lane finds that the process of levitation when properly carried out collects in a condition of full visibility an average of ten times as many eggs as can be secured by other methods of slide preparation. In Bengal. for instance, he added by levitation about 10 per cent to the infection figures obtained from strained and centrifuged films; and Dr. Mhaskar, testing the results of examination by searching the stools for hookworms after a vermifuge had been given, found that levitation had disclosed 7 per cent more positive cases than had been yielded by ordinary film examination. Dr. Lane is continuing his studies with the aid of a small subvention from the Board, and proposes to establish, by actual counts of eggs in fixed quantities of stool, what proportion of the eggs are lost and what proportion are collected in a condition of full, uncamouflaged visibility, in examinations by the plain smear, the centrifuge, the salt flotation, and the levitation techniques. In each case comparison will be made of the figures for stools treated and stools untreated by chemical preservatives.

ESTIMATING SEVERITY BY COUNTING EGGS IN FECES

Dr. W. G. Smillie conducted in Brazil during 1921 a test in which he sought to ascertain the possibility of estimating the severity of infection by counting the ova in the microscopic field. One hundred thirty-five cases harboring an average of thirty-two worms each, forty of which had been found negative with the microscope, were included in the test. The centrifuge method of examination was used, and the positive cases were classified into five groups in accordance with the number of ova found in the stools. The cases were later treated and all their worms expelled.

So far as general averages were concerned there was a definite relationship between the number of ova in the stools and the number of worms in the intestines, but in individual cases the clue afforded by a single examination of the stool was very unreliable. One individual having very abundant ova harbored only twenty-three hookworms; while others having so few ova that they were found only after long and careful search,

harbored from 150 to 200 hookworms.

DIFFERENTIATION OF HOOKWORM AND STRONGY-LOID LARVAE

In the routine examination of feces in field laboratories it is difficult to distinguish hookworm from Strongyloid larvae. Dr. Smillie has evolved a simple process for identifying the larvae, based on the marked differentiation that takes place as they mature. The technique results in many specimens being found to contain Strongyloides that are unrecognized by routine microscopic examination.

At the end of the day's work specimens containing the larvae to be identified are prepared in a Petri dish of standard size. In the center of the dish a circle from five to seven centimeters in diameter is drawn with a wax pencil or with cocoa butter. Within this circle are placed from one to two grams of feces and from one to two mils of water. The dishes are covered and allowed to stand at a temperature of from 75° to 90° Fahrenheit. The cultures may be observed on the following morning—fourteen hours after preparation,—and again on the second morning—forty hours after the culture was begun. The top is removed from the Petri dish and an ordinary hand lens is used in searching for larvae in the water surrounding the feces. During the interval of fourteen hours the larvae leave the feces for the surrounding water and swim freely about in large numbers.

The different habits and sizes of the two larvae render identification easy. The Strongyloides occur in two forms: the first as free living adult males and females, which usually appear near the margin of the feces and are of a size to be readily visible to the naked eye; and the second as filariform Strongyloid larvae found at the very periphery of the water, usually with their bodies at a right angle to the circle, and in active, even frantic, motion. Hookworm larvae differ from the free living Strongyloides in that they are many times smaller and are usually found at or near the fecal margins. They are sluggish in motion and thus offer a marked contrast to the active filariform Strongyloid larvae.

IV

MALARIA CONTROL

ANTI-MOSQUITO MEASURES: SOUTHERN STATES

Malaria control by anti-mosquito measures made marked progress in the Southern States during the year. Despite unfavorable financial and climatic conditions a total area of 225 square miles was controlled and a total population of 228,740 persons protected. Through joint co-operation between the town and county authorities, the state boards of health, the United States Public Health Service, and the International Health Board, new demonstrations were conducted in twenty-six towns in the states of Alabama, Arkansas, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Texas; and in thirty-five other towns in these states and in Virginia supervision was given to the maintenance of control established in previous years. A considerable number of towns also conducted control measures on their own initiative and without outside assistance, a number of transportation and industrial corporations interested themselves in anti-mosquito activities, and from the towns the work began to spread to rural communities.

Measures Employed. In the work of control, effort centers on the elimination of the breeding places of malaria mosquitoes. The measures employed consist of simple drainage, filling borrow pits and shallow pools, channeling streams, clearing the margins of streams and ponds, removing obstructions, letting in the sunlight, oiling, and enlisting the services of the top minnow (Gambusia affinis) to keep down breeding. It is necessary also to protect unscreened or unsatisfactorily screened wells and cisterns and to remove or cover old tin cans and similar artificial containers.

In all towns in which work is conducted preliminary surveys are made to determine whether effective malaria control can be secured at reasonable cost. Whenever possible the surveys are made late in the summer or in the autumn of the year preceding the beginning of control effort. The drainage operations are usually so planned as to be practically completed before the mosquito season opens.

The measures employed, while practically eliminating the malaria mosquito, do not guarantee freedom from the mosquito as a pest. A significant decrease in the numbers of all mosquitoes—Culex as well as Anopheles—results, but it is much more difficult and expensive to obtain freedom from all mosquitoes than from Anopheles alone. To obtain complete mosquito control careful inspection of backyards and surrounding premises is required.

Results and Costs. Figures 21 and 22 (pages 113 and 114) exhibit typical results accomplished. The reduction in malaria on the basis of

All cost figures given in this paragraph exclude the expense of general supervision.

physicians' calls is in the case of some towns as high as 90 per cent. Figures showing the reduction effected are not available for all towns. however, as information concerning malaria incidence is seldom recorded for the years that precede the control program.

Several towns reported that the control operations resulted in malaria being completely eliminated. Physicians were practically unanimous in reporting a marked reduction in the number of their visits for malaria. and pharmacists stated that there had been a noticeable diminution in the demand for chill tonics and similar proprietary "remedies" for malaria.

In the new towns the cost of original installation during 1921 ranged from \$225 for the town with the lowest cost to \$6,234 for that with the highest, the total for the twenty-six amounting to \$67,411. Inasmuch as a total population of 67,063 was protected, distributed in towns varying in size from 268 to 13,088, the cost per capita was \$1.01. In the other thirty-five towns the maintenance measures protected a total population of 161,677 at an average cost per capita of only twenty-five cents.

Data submitted by thirteen of the twenty-six installation towns indicate that the average first year's cost of each main feature of the work was as follows: ditching \$345 per mile, clearing streams \$95 per mile, and oiling \$3 per mile. The average cost of maintenance was \$16 per mile. Premises were inspected for mosquito breeding at an average cost of six cents. All of these costs, of course, are subject to wide variation depending upon conditions to be met. Nevertheless, it is felt that the averages are fairly representative. In some towns natural conditions made possible control at trifling cost. Thus, in Bullard, Texas, control was secured for only \$66.83, of which \$11.83 was spent for oil and \$55 for the labor of applying it.

The effectiveness of the control program is well illustrated by statistics for the town of Lake Charles, Louisiana. This town, with its population of 13,088, was embraced within the extra-cantonment zone in which anti-mosquito measures were carried out by Government during 1917. For that year the estimated calls for malaria numbered 250. The next year, following the installation of control measures, the calls dropped to eight. Upon the close of the war control effort in the town and vicinity was permitted to lapse, with the result that the cases of malaria rose to 500 for the year 1920. In 1921, following the renewal of control effort

in April of that year, the total number of cases was only fifty.

Economic Value of Work. Complete data are not available to show the economic loss that results from malaria, and estimates are in most cases difficult to make. Nevertheless, certain facts and figures collected during 1921 are at hand to indicate the saving in dollars and cents effected by the application of control measures.

Thus, the town of Lake Charles, Louisiana, sustained during the year 1920 losses from malaria estimated at \$26,000. During 1921 control measures, which practically stamped out malaria and eliminated this loss, were applied at a cost of only \$4,965, representing a saving to the town in its malaria bill of \$21,035, or 81 per cent. Again, Mr. George L. Grogan,



Fig. 55.—Ditch along railroad embankment, before and after draining, Demopolis, Alabama. Minor drainage operations constitute the chief feature of anti-mosquito measures as conducted in the Southern States



Fig. 56.—"V"-shaped ditch, a part of the drainage system installed to control malaria in and near La Puebla-Rivas, Nicaragua

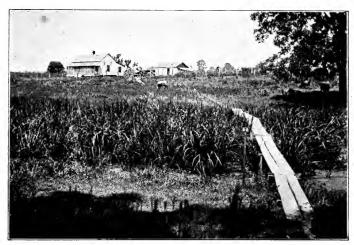


Fig. 57.—Anti-malaria, impounding water experiment at Mound, Louisiana. View across bayou, 700 yards above dam site, before clearing

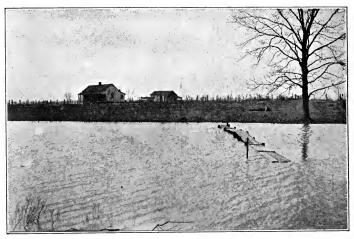


Fig. 58.—Same as Fig. 57, showing bayou filled with water

manager of the Grogan Lumber Company at Gladstell, Texas, states that the installation of control measures during 1921 cost the town a total of \$5,036 and protected 500 people. In this instance the first year of control cut the company's malaria bill in half.

Public Appreciation. The work is meeting with high favor in all the states, as is evidenced by the fact that in practically all the towns where it has been begun there is almost no opposition to its continuation. Many of the towns in which demonstrations are made continue the drainage work during the winter months and in the spring have the ditching in

good order for early work to prevent mosquito breeding.

The town of Crossett, Arkansas, continued control measures during 1921 for the sixth consecutive year at a cost of \$5,349 for the year; the town of Hamburg, Arkansas, completed its fifth, and the towns of Lake Village and Dermott, Arkansas, their fourth, successful year of malaria control (Figs, 21 and 22, pages 113 and 114, exhibit results accomplished). In all these towns the bulk of the citizens heartily endorse the work and there is every indication that it will henceforth be carried on as a regular municipal function.

Consolidation and Extension of Service. The work of the year has been characterized by a growing tendency to center control measures in the county health departments, and to arrange through them not only for the initial installation but for subsequent supervision and maintenance. The state boards of health are also taking active interest in the work, and many of them are securing their own malaria control personnel. During the year the Board assisted six of these states—Alabama, Arkansas, Mississippi, Missouri, South Carolina, and Virginia—in providing supervisors to assume direction of comprehensive plans for the control of malaria within their borders. The state boards of health have made creditable progress in securing legislative appropriations for developing and aiding in measures for the control of malaria. It is estimated that six states expended at least \$50,000 in this way during 1921. Future plans contemplate the expenditure of much larger sums in this work.

COUNTY-WIDE ANTI-MOSQUITO MEASURES

The effectiveness of county-wide malaria control operations under the direction of a full-time county health officer was demonstrated during the past year in several Alabama counties. The effort grew out of the work conducted during 1920 in several towns of the state, which awakened interest in malaria control and suggested to the State Board the idea of attempting to carry out similar measures in both towns and rural districts

¹ Following the original survey and before control effort is inaugurated the towns agree to defray certain items of expense associated with the work, as well as to set aside in future years the sums necessary for its maintenance. The agreement entered into with the towns contains careful estimates of original installation as well as maintenance costs. Persons who may be interested in the particulars of this phase of the work will be furnished a sample copy of the agreement upon application to the International Health Board, ô i Broadway, New York City.

through the county health departments. A malaria control engineer was added to the staff of the State Board, to co-operate with the county health officers, and Calhoun, Talladega, Sumter, Morgan, and Tuscaloosa counties were selected for the work. From the inception education and publicity were stressed.

Extent of Control Effort Undertaken. Active operations were begun April 1, 1921. By the end of April control effort was going forward in nineteen centers of population. Gradually other towns, and later the inhabitants of certain rural areas, took it up, until by the first of September it was under way in thirty-two towns and in fourteen rural districts. In some towns the regular city employes devoted to the work such time as was needed; in others the town marshal, assisted by prisoners, attended to it; in others still the towns paid nominal fees to some of their citizens. During the progress of operations in the five counties a total of 108 miles of ditches were dug, 1,298 miles of waters were oiled, and 86 miles of vegetation and other obstructions were cleared away from the banks of streams, ponds, and similar bodies of water. In addition 136 separate water deposits were stocked with the larvae-consuming top minnow, for the free distribution of which hatcheries were established at convenient locations in several of the counties.

Results and Cost. In the rural districts of all the counties many streams, lakes, and ponds were stocked with fish and many miles of ditches were dug. In one county in particular, where practically the sole source of Anopheles mosquitoes was stock ponds and small fish ponds, hundreds of these were stocked with Gambusia or were so cleaned by their owners that effective fish control was obtained. As a result a tremendous area was practically freed of Anopheles mosquitoes. The population protected in the several counties was 92,000, the total sum expended \$3,108.11, and the cost per capita thirty-four cents.

ANTI-MOSQUITO MEASURES UNDER TROPICAL CONDITIONS

Efforts to adapt to tropical conditions the anti-mosquito measures whose value has been so convincingly demonstrated in the Southern States were continued in Porto Rico and Nicaragua during 1921. In both countries control is being sought by the use of top minnows, supplemented in Nicaragua by drainage and in Porto Rico by drainage and oiling. The complete results of the Porto Rican experiment are not yet known. The data at hand indicate that under tropical agricultural conditions in Porto Rico malaria cannot be controlled unless Anopheles breeding is prevented for a distance of at least 1½ miles from the nearest house.

Demonstration in La Puebla-Rivas, Nicaragua. During March and April, 1921, surveys were made in two towns of Nicaragua—Buenos Aires and La Puebla-Rivas—to determine the feasibility of undertaking malaria control by anti-mosquito measures. The surveys resulted

in the recommendation that experimental effort be undertaken in an area embracing approximately three square miles, forming part of the town of Rivas and the adjoining semi-rural district, really a part of the town, known as La Puebla. The work begun here in June has shown conclusively that anti-mosquito measures are applicable for the control of malaria in tropical towns, certainly under the conditions that exist in the towns of Nicaragua. The undertaking has awakened much interest in neighboring communities, a number of which are requesting assistance along similar lines.

Results and Costs in La Puebla-Rivas. No data are available for physicians' calls in earlier years. However, 43.6 per cent of the total population of 1,416 gave a history of attacks of malaria during the preceding twelve months. Examination of the blood of 200 persons, made for the purpose of checking the history index, yielded 139 positive results among 152 persons who gave positive histories, and indicated the histories to be approximately 90 per cent accurate.

During the period of control effort (June to December, 1921), which includes the period of highest malaria incidence (August to December), 27.7 per cent of the inhabitants had febrile attacks resembling malaria, indicating a diminution in the malaria rate of 36.5 per cent as compared with the incidence for the preceding year. A parasite index of 525 children, taken in August, 1921, and to be repeated in January and February and again in August of 1922, will give a truer estimate of results. There can be little doubt, however, that the degree of protection afforded was much higher than is suggested by the estimated reduction of 36.5 per cent, inasmuch as relapses unquestionably played an important part in raising the 1921 figures.

Excluding the expenditures for general supervision, the work was conducted at a per capita cost of seventy-four cents for the seven months it was in progress, or at an average rate of about one dollar for the year. This cost of original installation is slightly below the average cost of similar work in the Southern States. There is, moreover, every prospect that under Nicaraguan conditions the cost of maintenance will be considerably lower.

CONTROL BY STERILIZATION OF CARRIERS

The Mississippi delta is one of the regions in which the control of mosquito breeding is not economically feasible. In this region, therefore, experimental work in the control of malaria has been concerned with the sterilization of carriers. The work has been conducted under the general supervision of the Mississippi Department of Health and under the scientific direction of Dr. C. C. Bass, Professor of Experimental Medicine in Tulane University. It has been under way since 1916 and has dealt with many thousands of people. In the opinion of Dr. Bass its results indicate that with sufficient quinine available and the people sincerely desirous of being rid of the disease, malaria may be controlled by quinine treatment alone in any area of the world.

Extent of Experimental Effort. The study was conducted during 1916 and 1917 in an area of 328 square miles in Bolivar county, Mississippi. As a check on the results accomplished and while the figures for the Bolivar county work were being analyzed, work was also undertaken at the state prison farms in Sunflower and Quitman counties and at Parchman Penitentiary in Sunflower county.

The total population dealt with during the two years was about 35,000. During 1916 the work was conducted in an area of 225 square miles with a population of 20,040. A total of 37,841 blood specimens were examined during the year, and 13,403 quinine treatments were given. During 1917 an additional area of 103 square miles was covered and a large part of the 1916 area was investigated once or oftener to ascertain what effect the quinine treatment of the preceding year had had upon the incidence of malaria. A total of 45,889 blood specimens were examined during this year and 8,774 quinine treatments given.

Method of Treatment Experimentally Developed. The observations made during this two-year period shed considerable light upon many important questions involved in malaria control. Extensive tests of different salts and doses of quinine, carried on during 1917 at the prison farm in Sunflower county—because more dependable observations could be made on convicts than on free living people—together with experiments in methods of treatment followed by resurveys in various other communities during 1917 and 1918, made it possible to develop a standard treatment that gave promise of effectively immunizing the carriers.

Thorough investigations were undertaken to determine such questions as the total amount of quinine necessary to disinfect adults and children, the form in which the drug was most effective, the size of the daily dose, the manner in which the drug could be most conveniently and most effectively administered, the length of time over which treatment should be given, and the time or times of day at which it should be taken. Attention was also devoted to the question of whether or not there are persons to whom, because of a constitutional idiosyncrasy, the drug may not

be administered.

Before adoption as part of the standard routine each particular phase of the treatment was experimentally tested and checked from carefully compiled records. The dosage finally decided upon was ten grains of quinine sulphate, with the following proportionate doses for children:

A ge	 Proportion of Adult Dose 	Dose for Children
Under 1	0.05	½ grain
ı year	0, I	1 grain
2 years	0.2	2 grains
3-4 years	0.3	3 grains
5-7 years	0.4	4 grains
8-10 years	0.6	6 grains
II-I4 years	0.8	8 grains
15 and over	1.0	10 grains

The medicine was to be taken at bedtime each night for a period of eight weeks. That the ten grains daily dose was about the smallest dose that could be depended upon to prevent multiplication of the parasites was

shown by the fact that clinical symptoms developed in a few instances among the several thousand persons who were taking it. According to data collected the treatment disinfected more than 90 per cent of the carriers, relapses occurring in very rare instances. The studies indicated that there were few people to whom it was unsafe to administer quinine.

In two communities prophylactic treatment was used; that is, smaller quantities of quinine were administered over a longer period of time—not in an effort to cure or disinfect, but merely to guard against acute attacks. The results indicated that if such treatment were continued during the transmission season for several years, it would effect a great reduction in the incidence of malaria. However, thirty-two persons among the 1,657 who took prophylactic treatment suffered malaria attacks and had to be put upon curative treatment.

Test of Treatment in Sun-flower County, 1918. The next step was to test the efficacy of the immunizing treatment as a control measure in a typically malarious region. Accordingly, in 1918, a demonstration campaign was inaugurated in an area of 100 square miles located in Sunflower county, Mississippi. This area had a rural population of 8,052, with 1,000 additional persons residing in the town of Ruleville.

The proposed plan called for public meetings to advertise the scope and purpose of the work, for malaria surveys, for the furnishing of free quinine to all persons who gave positive histories or positive blood indices, and for following up the quinine treatment to see that it was taken on a

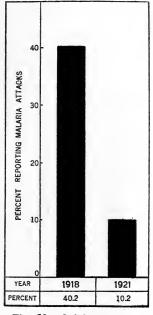


Fig. 59.—Quinine treatment controls malaria. In an area of 100 square miles in Sunflower county, Mississippi, only one third of the infected persons treated in 1918 suffered attacks the following year. Graph based on history index

regular weekly schedule. The work was to advance and to enter new communities as rapidly as conditions and facilities would permit.

Modification of Demonstration Effort, 1919–1921. This first demonstration achieved a considerable degree of malaria control. For the next year it was decided to discontinue free quinine treatment and to rely on county-wide publicity measures to stimulate the use of quinine in sufficient quantities for a cure. Practically nothing was done during 1919

in the 100 square mile area to hold what had been gained in the 1918 campaign, but the area was resurveyed in an effort to obtain further information about the results of the earlier work. During 1920 and 1921 there was a return to the 100 square mile area and an attempt to effect a further reduction in the incidence of malaria by persuading infected persons to buy the quinine and take the standard treatments. Intensive resurveys of the area were also carried on in both these years.

To summarize, the work of the four demonstration years was as follows:

1918-Intensive work in 100 square mile area.

1919—General publicity measures over entire county to induce infected persons to buy and take standard quinine treatment.

No special work in 100 square mile area except resurveys to determine results of 1918 effort.

1920—Return to 100 square mile area to check up results of 1918 work and to attempt further reduction in prevalence. As far as possible the various communities were taken up in the same order as in 1918. Intensive resurveys were made, complete records kept, and those who had malaria were advised to buy and take the standard quinine treatment.

1921—Same kind of resurvey and follow-up work as in 1920 conducted in 100 square mile area.

Result of Demonstration Effort. In spite of the fact that free distribution of quinine was discontinued at the close of 1918, that the majority of the people in the 100 square mile area were not again reached intensively until about two years later, and that quinine was not furnished them gratuitously even then, malaria was considerably less prevalent in the area at the close of 1920 than it was at the time of the first survey. Definite figures for the reduction accomplished to the end of 1920 cannot be announced until the returns for 1921 surveys have been completely studied. However, the number of cases of malaria per 100,000 residents during 1920 was 34.4 per cent lower in the 100 square mile area than in the whole county, and the death rate per 100,000 population was 65.9 per cent lower. Figures to the end of 1919 indicate, moreover, that the incidence of malaria was only 13.2 per cent among residents of the 100 square mile area who had been treated in 1918, as compared with the incidence of 40.2 per cent that obtained among these people at the time of their first quininization—a reduction of 67.2 per cent. In the intensive work in the 100 square mile area there was expended during 1918 the sum of \$8,633.44, during 1920, \$3,349.81, and during 1921, \$3,454.72. For the respective years the per capita costs were \$1.16, \$.38, and \$.38, or an average for the three years of \$.70.1

Distribution and Sale of Standard Quinine Packets. The immunizing dose of quinine adopted after the experimental work in Bolivar and Sunflower counties was endorsed by the United States Public

¹ All cost figures exclude the expenditure for general supervision.

Health Service in 1918. In 1919 the National Malaria Committee adopted it and recommended it to practicing physicians and to the publishers of medical textbooks. State and county health departments in Mississippi and other states are now stimulating the distribution and sale of handy packets containing the standard treatment at all drug and crossroad stores. In the Southern States several million doses have been taken. Six hundred thousand were taken in one Georgia county alone during the year 1920. Among the 10,000 persons who took the medicine only twenty-seven developed chills and fever.

Determining the Malaria Carriers. For estimating the prevalence of malaria in original surveys as well as resurveys, a combination of history and blood indices was used. In taking the histories only those persons were recorded as positive who had had attacks within twelve months. Persons who have not had attacks within this period are usually free of the parasites and are not malaria carriers. In no case was the blood of persons giving positive histories examined unless there was some special reason for so doing.

The blood of 31,459 persons was examined one or more times during 1916 and 1917, and malaria parasites were found in 21.2 per cent of the cases. More than half (55.1 per cent) of all the positive cases had stated, previous to blood examination, that they had had one or more attacks of malaria during the preceding twelve months; while 72.4 per cent of those who carried gametes had given a positive history. Thus, as is to be expected, the history index is shown to be more trustworthy when gametes are in the blood than when they are not.

EXPERIMENTS AT MOUND

At Mound, Louisiana, during the malaria seasons of the years 1920 and 1921, representatives of the United States Bureau of Entomology and of the International Health Board have conducted, along parallel lines, various field studies and experiments in malaria control in which the United States Bureau of Fisheries and the United States Bureau of Plant Industry have co-operated with the Bureau of Entomology. The investigations have dealt with control by screening, by the relocation of houses, by killing adult mosquitoes in the houses, by using mosquito netting over beds, and by impounding the water of bayous and depending upon top minnows and wave action to keep down breeding. As an incidental feature of the experiment in relocating houses, Dr. C. G. Bull of the Johns Hopkins School of Hygiene has co-operated in developing a technique for determining definitely the sources of blood meals of mosquitoes.

¹ Dr. Bass's final report will give full details as to the method followed in collecting and staining blood specimens and in microscopically examining specimens for the malaria parasite, as well as his observations on the relative accuracy of different persons who examine specimens in the laboratory and on various other technical subjects which were investigated in an effort to work out a thoroughly satisfactory method of diagnosis.

Impounding Water Experiment Highly Promising. Only one of the experiments—that of impounding water in bayous which cannot be drained—has proceeded sufficiently far for definite conclusions to be reached. This method, which was developed originally by the Bureau of Entomology and given further test through the co-operation of the International Health Board, has yielded results far beyond expectation.

The bayous of the Mississippi delta are streams flowing through channels cut by the river at flood. By means of damming, the bayous are converted into a series of lakes. The marginal zone is transformed into

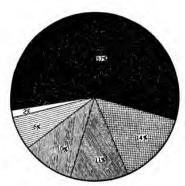


Fig. 60.—Proportionate rates of sickness from malaria and other diseases among rural population of seven counties in Southeast Missouri. Malaria caused 57 per cent of the total illness; digestive diseases, 14 per cent; respiratory diseases, 11 per cent; systemic infections (excluding malaria), 6 per cent; nervous diseases, 2 per cent. Ten per cent of the diseases could not be classified

a pasture by removing tangled undergrowth along the edges, and domestic animals are introduced to crop close the vegetation along the water's edge and permit the waves and top minnows to act effectively. The maintenance of a water level sufficiently high to suppress the growth of aquatic and semi-aquatic vegetation, and a clear margin, are the essential conditions of success.

Results of Impounding Experiment. A survey made more than a year after the completion of impounding gave only one collection of Anopheles larvae within the zone of control. Above and below it numerous specimens were obtained. The elimination of Anopheles breeding in the impounded section seemed to be the result of several factors, among which were: increased water depth, wave action, absence of vegetation near shores, absence

of small organic and inorganic particles derived from submerged débris and vegetation, and finally larval reduction by fish.

Economic Return. Apart from the elimination of Anopheles breeding, several economic advantages resulted from the impounding experiment. Much additional pasturage was opened up; animals were provided with plenty of clean water throughout the dry season; and the supply of large edible fish became more abundant through the increased breeding produced under the more favorable conditions of the artificial lakes. The work of clearing the ground and constructing the dams cost only a little more than \$600.

A MALARIA SURVEY IN SOUTHEASTERN MISSOURI

In counties or communities where the physicians and the people do not recognize malaria as an outstanding public health problem, surveys are necessary to determine the advisability of using public funds for its prevention. From August to December, 1921, Dr. Mark F. Boyd of the Board's field staff, in service with the Missouri State Board of Health, conducted such a survey in a group of seven counties containing a rural population of 147,845, constituting the southeastern corner of the state. He

selected for intensive study a typical rural area of about 141 square miles, containing a population of 2,966. Some of his findings are interesting and significant.

These counties lie on the northern border of recognized malaria zone for the United States, and yet Dr. Boyd finds malaria responsible for nearly 60 per cent of the illness. About 12 per cent of the entire rural population in the lowlands was found infected, with an estimated general malaria incidence of about 20 per cent. Of the people having attacks of malaria about 36 per cent consult a physician; about 16 per cent have no treatment: and the remainder dose themselves

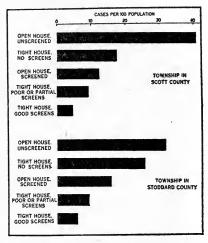


Fig. 61.—Effect of screening and construction of houses on incidence of malaria, two Southeast Missouri townships

with chill tonics or quinine. None were found who had received what is regarded as the minimal dosage of quinine necessary to make a cure reasonably certain. The people living in open, unscreened houses have four times as much malaria as those living in well-built and well-screened dwellings. Difference in degree of protection against mosquitoes seems to be mainly responsible for the fact that the infection rate was found among farm-hands, 14.6 per cent; among tenants, 10.2 per cent; and among proprietors, 7.3 per cent.

The outstanding fact is that malaria in this region is on the decline; and that the principal cause of the decline is systematic agricultural drainage. Dr. Boyd's conclusion is that in this region anopheline control as a health measure is not economically feasible; and that the key to the control of the residual malaria lies in improving housing conditions to provide better protection against mosquitoes and educating the doctors and the people in proper standards of malaria treatment and the importance of effecting a cure (see Fig. 61).

FIGHTING MOSQUITOES WITH FISH

Fish played during 1921 a most important rôle in practically all the operations conducted against yellow fever and malaria. During the twenty years that have elapsed since 1900, when the United States Bureau of Fisheries began its investigations into the usefulness of the top minnow for destroying mosquito larvae, many experiments in the use of fish to keep down mosquito breeding had been made in various parts of the world, and some of them had yielded valuable and farreaching results. Among them may be mentioned the work of the New Jersey Agricultural Experiment Station during the years 1902 to 1911; the observations of Geiger on the use of fish in rice fields near Lonoke, Arkansas; and the experimental work of Hildebrand, of the United States Bureau of Fisheries, near Augusta, Georgia, and elsewhere. Investigators in a number of other countries, particularly in India, have also made valuable contributions.

But the effectiveness of fish as a means of checking the breeding of malaria mosquitoes was first demonstrated under representative agricultural conditions in an experiment carried out by Dr. H. H. Howard in Hinds county, Mississippi, during the years 1918 and 1919. In a district thirty-six square miles in extent, with a population of 830 living in 172 homes, mosquito breeding was successfully controlled by the use of fish aided by only two inspectors. Fish were also used as an auxiliary but very effective measure of mosquito control in the campaign against yellow fever in Guayaquil in 1918 and 1919.

Elimination of Stegomyia Breeding Places in Guayaquil. In the city of Guayaquil, Ecuador, the main breeding places of the yellow fever mosquito—the large water-tanks—were covered and sealed, and fish were placed in the many smaller water containers that could not be so treated. The covering of the tanks greatly reduced the number of yellow fever cases; the use of fish in the smaller containers completed the eradication of the disease. Since then there has not been a single case of yellow fever in Guayaquil. During 1920, at a time when the supply of fish was temporarily exhausted, the percentage of containers other than tanks in which yellow fever mosquitoes were breeding rose rapidly from two to ten. The use of fish effected a notable economy in the cost of the campaign, making possible a reduction of the inspection personnel from 139 to 20.

Fish the Main Reliance in Peruvian Yellow Fever Epidemic, 1920–1921. For combating the severe yellow fever epidemic in Peru during 1920–1921, Dr. Hanson discontinued emptying and filtering and used fish in all classes of containers. The total of 750,000 fish that had been distributed by the end of 1921, brought down the mosquito









Fig. 62.—Several phases of yellow fever operations in Mexico and Central America. Home with water tank well screened; inspectors examining water barrels to detect possible Stegomyia breeding; fish distributor on way to landing place; oilers visiting homes to oil wells and small pools

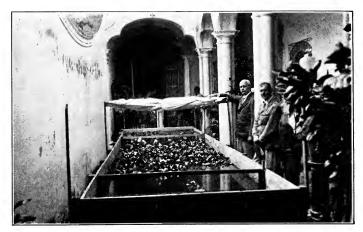


Fig. 63.—Tank at Colima, Mexico, from which are distributed the small fish placed in water containers at the homes. The fish devour the larvae of yellow fever mosquitoes in water containers



Fig. 64.—Transporting fish from landing place to headquarters. Operations against yellow fever in Túxpan, Mexico

index and held it to a safe limit over the territory lying between the sea and the mountains and extending from the borders of Ecuador to Lima, a region 500 miles long and from fifty to seventy-five miles wide. Dr. Hanson states that in his opinion the control of breeding over so vast an area would have been impossible but for the use of fish.

Fish the Chief Weapon in Mexican Yellow Fever Campaign, 1920-1921. The successful use of fish in other regions led to their being adopted by Le Prince in the summer of 1920 for the eradication of yellow fever in and around Tampico. The plan adopted for this city and the oil camps adjacent to it consisted of an intensive fish campaign in which every type of water container was stocked with suitable fish. As supplementary aids, and for securing control in bodies of water in which fish were not effective, oiling and other methods were resorted to. From a visit to about 500 homes in the city of Tampico in 1921, Dr. Connor estimated that the use of fish had yielded an 80 per cent degree of control.

a. Use of fish in Vera Cruz. Dr. Caldwell, director of the yellow fever control campaign in and around Vera Cruz in 1921, after visiting Tampico in 1920 to familiarize himself with Le Prince's methods, decided upon a campaign along similar lines for Vera Cruz. Fully one half of the containers in this city were of a type that held but little water and could be easily emptied. For these, frequent inspection with emptying and cleaning proved to be the most satisfactory method of control. Containers of the other large class, including barrels, pozos, and tanks, were covered where practicable. Where this could not be done, the introduction of fish gave highly satisfactory control. For the few containers and other breeding places that could not be covered and in which fish could not be used, it was necessary to resort to oiling.

b. Fish prove effective in Merida. In Merida, Yucatan, the aljibe (stone cistern constructed under the patio) was the preferred breeding place of the Stegomyia. Next, in the order named, came tanks, barrels, lejia, and smaller containers. To free the aljibe of breeding, fish were resorted to because covering was too expensive. Fish were also employed with excellent results in barrels, tanks, and other large containers. Small containers were emptied and their number reduced as much as possible. Dr. Connor, in his report for May, 1921, says that of 12,324 water containers in which fish were used, inspection revealed not a single

one harboring larvae or pupae.

Use of Fish in Central America. In Nicaragua fish played a part in controlling the outbreak of yellow fever in Managua in August, 1919. They were not generally used in that country, however, until early in 1921. Dr. Molloy reports that they disappear from small pilas filled by taps, and from rain barrels, when the water runs over. In tanks, and in pilas filled from wells, however, they have given excellent results.

In the malaria control studies conducted in the department of Rivas, Nicaragua, during 1921, small fish of the Poeciliidae species were relied on exclusively to control breeding in streams and ponds. With proper clearing away of the underbrush and cleaning of the banks—a very inexpensive process—they yielded satisfactory control. To eliminate the principal breeding places of the region it was necessary merely to clean and straighten the banks of two rivers and give the top minnows a chance to perform their work. Fish were also used with excellent results to stop mosquito breeding in the artificial containers and wells found around houses.

In Salvador fish played an important rôle in maintaining, with a minimum inspection force, low mosquito indices in the principal cities. From hatcheries established in San Salvador and Sonsonate and in the Oriente, fish were widely distributed. In the opinion of Dr. Bailey fish alone would completely eliminate mosquito breeding if it were possible to secure proper care for all distributed and if the thousands of small containers in which they cannot be used could be emptied regularly or done away with.

A striking example of the part fish played in mosquito control is reported from the city of Sonsonate, Salvador. Even with persistent inspection of containers for many weeks it was practically impossible to reduce the house index below 4.2 per cent. Fish were then introduced, and in a very short time the index was reduced to 0.6 per cent. One year after the disappearance of yellow fever from Sonsonate, fish distribution was suspended, with the result that the percentage of houses in which Stegomyia were breeding rose rapidly from about 1 to 9 and the breeding in containers from 0.4 to 5.3 per cent.

In Guatemala fish have been effective in the classes of containers in which they can be used, but Dr. Vaughn reports that of the 30,000 containers in the yellow fever zone of that country only 2,900 are suitable for the use of fish. The larvae in those into which fish were introduced were greatly reduced in numbers despite the high mortality of the fish and the difficulty of keeping the containers adequately stocked.

Control of Malaria in the Southern States. In the Southern States fish are being extensively used to control the breeding of the malaria mosquito. In practically all the towns in which there have been demonstrations of malaria control by anti-mosquito measures during 1920 and 1921, they have been an important auxiliary to drainage and oiling and in many instances the chief or even sole reliance.

In a group of five counties in Alabama practically every farmer has convenient access to a minnow hatchery from which he is able to stock breeding places with fish as occasion arises. The city of Richmond, Virginia, has stocked all its fountains, reservoirs, and lakes with top minnows, and has established hatcheries to furnish the fish free of charge to any communities in the State that want them.

Kinds of Fish to be Used. In each locality a special study must be made of the kinds of fish available, of their habits, and of the conditions under which they are to be used. It is not safe to assume that because a certain species eats mosquito larvae in the laboratory, it will be useful in an anti-mosquito campaign. The larvae-eating habits of the species must be studied under conditions that closely approach those under which it is to be used. All authorities agree that an indigenous fish is preferable. If an indigenous variety is not used, the imported species must be thoroughly acclimatized and allowed to adjust itself gradually to its new habitat. Small fish of the family Poeciliidae, widely distributed throughout the tropical and temperate zones, are the ones most extensively employed.

COUNTY HEALTH WORK

The county offers a most effective unit of organization for providing adequate health service to the smaller towns and rural communities. The need of such service was strikingly demonstrated by field investigations conducted in the Southern States between the years 1910 and 1915. Study of the sanitary conditions surrounding 274,420 homes in 747 counties in eleven states showed that only 12,145, or 4.4 per cent, had

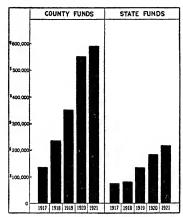


Fig. 65.—Growth in funds set aside for county health work, nine southern states, 1917–1921. Includes appropriations by states, counties, International Health Board, and other agencies

latrine accommodations could be regarded as satisfactory for the prevention of soilborne diseases. One hundred thirty-four thousand and eight. or 48.8 per cent of the homes, had no latrines; 128,267 others. or 46.7 per cent of the total, had the grossly insanitary open-seat surface latrines. Only here and there were county health departments maintained, but in such counties the sanitary conditions were better at the time of original inspection, it was easier to secure needed improvements, and the advantages, once gained, were seldom lost.

In the development of county health work the Board has been serviceable in providing funds for initial demonstrations. Its contributions have stimulated appropriations by counties and legislatures; and the demonstra-

tions thus supported are creating a sustaining public sentiment. The state and county appropriations usually show wholesome growth from year to year, and are seldom reduced even in the face of the severe economic depression that has necessitated curtailment of many useful forms of service.

SCOPE AND EXTENT OF SERVICE

During the year 1921 co-operative projects in county health organization were carried out with the Board's participation in seventy-seven counties in sixteen states. The total sum appropriated by all the agencies which co-operated in these projects was \$758,904, of which the counties themselves provided \$344,081, the state boards of health \$156,658,

and the Board \$177,777. The remaining \$80.387 came from other sources, including the United States Public Health Service and the American Red Cross, or from municipalities and private corporations or individuals.

During the year 1921 new work was begun or arrangements for beginning it were completed in five states in addition to the twelve 1 in which it was previously in progress. These five states were Florida, Indiana, Louisiana, Maryland, and Missouri. There was thus a total of seventeen states in which operations were under way or contemplated at the close of the year. The extension of the work has been most rapid in North Carolina, which now has twenty-seven full-time health departments, and in Alabama, which has eighteen.

The plan of work pursued by the county health departments has been evolved from experience, is applicable under a wide variety of conditions, and has stood the test of time. Though there are minor differences to meet local conditions, the most important activities, which are more or less common to all the units, group themselves under the following main heads: (1) public health education; (2) sanitation: (3) control of communicable diseases; (4) adult and child hygiene. The demonstrations are so planned as to enable any county to undertake at the start, in a small way and with the least expenditure of money, the line or lines of work which for that particular

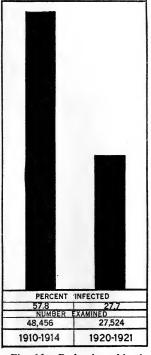


Fig. 66.—Reduction of hookworm infection rates, 1911 to 1921, in fifty-two counties in ten southern states. Based on the original infection surveys of 1911-1914, when 57.8 per cent of 48,456 school children examined were found infected, and the special re-infection surveys made during 1920-1921, when 27.7 per cent of 27,524 school children were found infected

county give promise of yielding the greatest results in lives saved and sickness prevented. Other activities are added and the health

¹ Alabama, Georgia, Kansas, Kentucky, Mississippi, New Mexico, North Carolina, South Carolina, Tennessee, Texas, Virginia, West Virginia.

department is expanded as the work proves effective and additional funds are provided.

PERSONNEL AND BUDGET

The personnel of the average county health department consists of a health officer, a sanitary inspector, an office assistant, and a public health

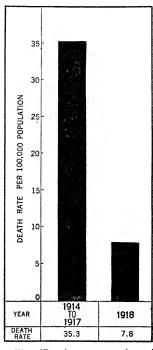


Fig. 67.—Average number of deaths from typhoid fever per hundred thousand population, nine North Carolina counties. Record for years 1914 to 1917, before inauguration of county health work, compared with that for 1918, the year succeeding its inauguration

nurse, though the staff is enlarged as occasion requires. The regular personnel serves on a full-time basis—a principle that is considered essential to the success of the work. The usual annual budget for a county of average size is \$10,000, though the amount may be increased in the case of larger or more prosperous counties, or be reduced in counties whose population is small or resources limited. Sometimes two or more sparsely settled counties combine to operate a health department.

In no case do the funds appropriated for the health department budget represent the total sum that the county residents devote to health protection. The work of the department invariably stimulates private expenditures for sanitary and other improvements that far exceed the amounts of the county budgets. To cite one of many instances, the citizens of Tazewell county, Virginia, contracted or paid out in four months during 1921 a total of \$60,000 for sanitary improvements recommended by the health department, although the total budget for the department during this period amounted to only \$3,000.

Public health nurses are being employed in increasing numbers. They furnish a close bond of contact between the health staff and the people. When a case of communicable disease is quarantined a nurse visits the

home and gives advice as to the methods to be followed in caring for the patient and in preventing the spread of the disease to other members of the family or to the community; when children are found to be



Fig. 68.—Health officer vaccinating children in rural school of Mason county, Kentucky. Small towns and rural communities, in increasing numbers, are providing themselves with health service of a type that has usually been found only in large cities



Fig. 69.—Trachoma clinic at Maysville, Kentucky, another feature of county health work as conducted in Mason county



Fig. 70.—Class of midwives, with their instructor (second from left), Davidson county, North Carolina. Many of the county health departments are making the instruction of midwives an important feature of their service



Fig. 71.—Children assembled to receive diphtheria immunization, Tyndale school, Lenoir county, North Carolina. The Schick test and toxin-antitoxin are proving effective weapons in the county health departments' fight against diphtheria

suffering from defects she consults with the parents and urges them to have the defects promptly corrected; and she renders valuable assistance to the health officer in the organization and conduct of clinics, in securing the co-operation of established welfare agencies, and in carrying out the general program of health education and community development.

ACTIVITIES UNDERTAKEN

The report for 1920 discussed somewhat in detail the activities usually embraced in the county health program. Of the newer activities undertaken by several of the departments during 1921, those concerned with county-wide effort for the control of malaria, with the use of the Schick test and toxin-antitoxin for the control of diphtheria, with measures against venereal diseases, and with the improvement of the physical condition of undernourished school children, may be worthy of separate discussion.

Anti-Malaria Work. The malaria operations conducted by the county health departments in Alabama have been fully discussed on pages 191 and 192. In other states also the departments undertook campaigns for mosquito control, advised suspected cases to have their blood microscopically examined and to consult a physician with regard to standard treatment if found positive, and in some instances they supplied free quinine in malarious districts. In the towns of Greenville and Farmville, North Carolina, it is reported that as a result of the antimalaria work conducted during the past two years under the direction of the Pitt county health department, malaria was reduced at least 75 per cent.

Control of Diphtheria and Venereal Diseases. The health departments in many of the counties made extensive use of the Schick test and of toxin-antitoxin for controlling epidemics of diphtheria in the late summer and fall of 1921, when the disease became quite prevalent in many counties; and in other instances effort was devoted throughout the year to the control of venereal diseases. The measures against the latter disease consisted in the main of clinics, the closing of houses of prostitution, and caring for sufferers to insure their treatment until cured.

Nutritional Work in the Schools. The nutritional work undertaken in a number of counties effected much improvement not only in the weight of the children but also in their ability to keep up with their studies at school. In Montgomery county, Tennessee, 373 pupils from thirteen rural schools gained in weight within three to fifteen weeks an average of three pounds each as a result of such simple measures as serving them daily with milk and hot lunches and urging them to observe precautions in the care of the teeth, sleeping with windows open, and taking daily a sufficient amount of outdoor exercise. In one of the largest schools in this county, with 700 pupils, the percentage of underweight children was reduced during the school term of 1921 from 36 to 14. In

Blount county of the same state 883 children gained in the same period an average of 6.2 pounds.

Miscellaneous Newer Activities. In several South Carolina counties the local physicians organized and held during 1921 free clinics for the treatment of general diseases, with especially good results in Greenwood county; and in Kentucky and Tennessee, where trachoma is widely prevalent in certain sections, a large number of clinics were held for the relief of this disease. In all the counties the problem of insuring pure milk supplies is receiving early attention. For this purpose some of the units have added to their staffs a veterinarian who inspects the product of dairies and other milk-handling establishments and requires that it be brought up to standard.

RESULTS ACCOMPLISHED

The co-operative projects carried out during the year 1921 have yielded results whose value exceeds by many times the sums appropriated. During the year, in addition to the results accomplished in other lines of effort, new latrines were installed or old latrines improved and made sanitary at a total of 34,186 homes; 13,450 cases of communicable diseases were quarantined; 257,526 vaccinations were given for typhoid fever and 83,467 for smallpox; and 257,319 school children were examined for physical defects.

Reduction in Typhoid. Figures 26, 66, 67, and 72, pages 125, 207, 208, and 213, exhibit some of the instances of marked reduction in sickness and death that have been reported. In Alabama typhoid fever declined 60 per cent in the four-year period from 1917 to 1921—a period that exactly coincides with the bringing of the city water supplies throughout the state under the direction of the state health department and with the placing of more than 45 per cent of the state's inhabitants under the protection of county health departments. In a section of Smith county, Tennessee, where for many years there had been a high incidence of typhoid fever, a remarkable reduction resulted from an intensive vaccination campaign in 1919. During the four-year period from 1916 to 1919, inclusive, there were in this area twenty-one deaths from typhoid fever and more than 200 cases. During 1920 not a single case of the disease was reported. In Blount, Montgomery, Roane, and Smith counties the average number of deaths per year from typhoid fever during the period from 1915 to 1919 was 48.2. For the two-year period 1920-1921, following the organization of county health work, the number fell to 22.2, a reduction of 53.9 per cent. In Blount county the authorities estimate that a saving of \$69,080 resulted from the service rendered by the county unit in reducing the incidence of typlioid fever.

Control of Smallpox, Diphtheria, and Other Epidemics. In Daviess, Harlan, and Scott counties, Kentucky, where in former years

smallpox claimed a heavy toll, epidemics were averted in 1921 by the prompt action of the county health departments. In neighboring counties the disease was rife. In Harlan county the highest number of cases prevailing at any one time in 1921 was eighteen, as compared with more than 500 in the adjoining county of Bell, which had then no county health department. In Scott county only thirty-one cases of the disease occurred, which were limited to fifteen homes; and in Daviess county only twelve cases developed during the months of April, May, and June, 1921, as compared with 185 cases for the same period in 1920. In Geary county, Kansas, during 1921, the department more than paid for itself

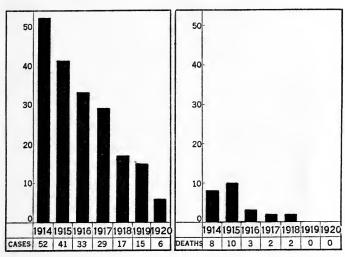


Fig. 72.—Control of typhoid fever in Pearl River county, Mississisppi, incidental to the county-wide efforts to guard against pollution of the soil

by preventing a threatened invasion of smallpox. In this county there were only fourteen cases of this disease, all of which were treated in their own homes. In an adjoining county the disease reached alarming proportions, necessitating the establishment of an emergency pest-house at an initial cost of \$5,000, a sum greater than that provided by the residents of Geary county for maintaining their health department for one whole year.

In Williamson and Montgomery counties, Tennessee, what threatened to be serious diphtheria epidemics were checked by the prompt action of the county health departments in examining contacts and isolating carriers and positive cases. Scott county, Kentucky, has had in the past two years only one death from diphtheria, whereas several neighboring

Kentucky counties without full-time health departments have had as many as twenty or more. In the city of Santa Fé, New Mexico, a threatened outbreak of scarlet fever was completely checked by daily inspection of school children and exclusion of suspects. The people had become much alarmed when this infection appeared in 1921, as several years before there had been a persistent and widespread outbreak with the deaths running as high as fifteen a day.

Reduction of Hookworm Incidence. The hookworm resurveys carried out during 1920 and 1921 (see discussion, pages 124 to 126) showed that the reduction of hookworm disease has been greatest in the counties in which county health departments have been in operation. This result may be attributed not only to the treatment of infected persons but, and more particularly, to the improvement in sanitation that has been effected in recent years. The resurveys in their turn have proved effective in stimulating public interest in further hookworm control and in general health work. In Baldwin county, Alabama, the authorities estimate that hookworm disease is costing the county not less than \$100,000 annually, and the systematic work of the county health department is gradually eliminating this loss.

CONTINUATION AND EXPANSION

The educational value of the work and the demonstration of the benefits to be derived from it find strongest expression in the action of the counties year by year in providing for its continuation and expansion. Coincident with the increase in funds there has been steady increase in the personnel engaged. The benefits of the work in one county, being seen and appreciated in adjoining counties, have led to demands for similar work. In Kentucky during 1921, for example, six additional counties—all of them adjoining counties in which work was already in progress—laid the foundation for whole-time health departments to be organized later.

The state of Ohio, which maintains its county health work independently of outside assistance, stands at the head of the list of states with respect to the number of counties having whole-time health departments. In Virginia, Alabama, Georgia, and North Carolina, however, the number of co-operative county projects has increased with great rapidity. The work has also spread from state to state until, at the close of 1921, it was no longer confined to the Southern States but was under way or contemplated in practically all sections of the country.

Not only are departments once established usually continued, but the appropriations for maintaining them are enlarged year by year, the range of activities undertaken is broadened, and in the end the departments, usually established at first on a trial basis for a period of one to three years, have been made permanent as the results they achieved have demonstrated to the people the wisdom of continuing them. As illustrating the manner in which the funds made available for the work are increased year by year, the record for the following five counties may be cited:

Mason county, Ky. Wilson county, N. C.	1917 \$4,400 3,485	1918 \$6,600 6,205	\$6,400 5,665	\$3,500 8,870	1921 \$10,000 12,105
Davidson county, N. C.	3,485	6,205	5,665	8,741	9,000
Northampton county, N. C.	2,904	6,332	5,702	8,232	9,000
Lenoir county, N. C.	2,904	6,332	5,702	8,482	9,000

COUNTY HEALTH WORK IN OTHER COUNTRIES

As county health work in the United States has been developed and its various lines of procedure have become established on a fairly satisfactory basis, it has in turn served to stimulate more active interest in rural health work in other countries. As a result the Board has been asked to aid in conducting demonstrations in general rural health programs in a number of countries, including Brazil, France, and Czechoslovakia. During the year the first rural health unit in Brazil was established in the county of Sertãozinho, in the state of São Paulo; and the prospects are excellent that within the next two years similar work will be developed in the states of São Paulo, Minas, Rio, and Rio Grande do Sul. With variations in working procedure to meet special conditions, and with adequate local appropriations available, it would seem feasible, through the extension of this type of work to rural regions in many quarters of the globe, to effect the same reduction in sickness and death rates and the same promotion of human welfare that has attended similar effort in the United States.

NOTES ON TABLES

TABLE I

- 1. Table 1 on the following pages presents a concise statistical summary—by the main geographical divisions of the work, by states and countries, and by years—of the persons examined and treated in the world-wide campaign for the relief and control of hookworm disease aided by the International Health Board. It shows that in the twelve years from 1910 to 1921, inclusive, a total of 3,770,624 persons have been examined in thirty-four different states and countries, of whom 2,232,756, or 59.2 per cent, were found infected. Of those infected, 2,020,396, or 90.5 per cent, were given one treatment; while 1,352,550, or 60.6 per cent, received two or more treatments.
- 2. Two treatments of a standard remedy remove, on the average, from 88 to 95 per cent of the worms harbored, depending upon the drug used and the method of administration; and it is seldom that they leave more than ten worms in the intestine. Thus, though some persons may remain lightly infected after two treatments, this number is nevertheless adequate to establish what may be termed a "practical" cure. One treatment, similarly, removes from 75 to 90 per cent of the worms.
- 3. Though the figures have been itemized by states and countries and by years, this has not been done primarily to invite comparison of the results for one state with those for another, or of one year's work with that of another. Too many variable factors affect the results for such comparisons to be entirely valid. For instance, among other reasons, the variations or fluctuations may be due to the density of population or severity of infection in the areas of operation, to size of working staff, or to differences in the plan of work pursued. In other instances, as in British Guiana in 1919 and Dutch Guiana in 1921, the figures may represent results for only a few months instead of a complete year.
- 4. The table includes the results of the early dispensary effort aided by the Rockefeller Sanitary Commission in the Southern States. These figures are not itemized by years, but are reported, under the respective states, as the total for the years 1910 to 1914, inclusive. Some of the work for 1914, separately indicated, was aided by the International Health Board. Since 1915, when work by the dispensary plan ceased in these states, the chief effort against hookworm disease has been directed

¹ See footnote 4, page 228.

toward the building and use of latrines. Therefore the aggregate figures for examination and treatment are not so large as in previous years, nor do they represent in all cases such thoroughgoing effort in the curative phase of the work.

- 5. In a number of countries operations were suspended during the war and resumed after its close; in others there have been temporary periods of suspension due to industrial depression, lack of trained directors, or similar causes.
- 6. Only the results of campaigns aided directly by the International Health Board or Rockefeller Sanitary Commission are included. In a number of countries, as in Brazil, government or voluntary agencies are conducting extensive independent campaigns against the disease, the results of which, if they could be included, would substantially increase the aggregate examinations and treatments.

TABLE 2

1. Table 2 shows that in the work of the International Health Board during the years 1913 to 1921, inclusive, a total of \$7,493,624.25 was expended. The table is based on expenditures actually made during the respective calendar years. The figures differ from those given in the Treasurer's statements forming part of earlier reports of the Foundation. The Treasurer's reports have included amounts paid in the field during the first three quarters of the respective years, to which have been added in many instances amounts paid during the fourth quarter of one year but not recorded until the first quarter of the succeeding year. The discrepancy is caused by the necessity of closing the Treasurer's books shortly after the first of each calendar year, before detailed financial reports can be received from countries in which a large part of the work of the Board is conducted.

TABLE 1: Persons Examined and Treated for Hookworm Disease, 1910 to 1921, inclusive, in World-Wide Campaign Aided by International Health Board. Figures by main geographical divisions of work, by states and countries, and by years

Division, Country, and State	Persons Examined	Persons Found Infected	Persons Given One Treat- ment ¹	Persons Given Two or More Treat- ments 2	Per Cent Found Infected	Per Cent Given One Treat- ment	Per Cent Given Two or More Treat- ments
All Years 1910–1914 1915 1915 1916 1917 1919 1920	3,770,624 1,179,406 35,397 164,293 223,976 294,367 374,330 397,423 479,916 621,516	2,232,756 458,606 17,791 94,938 133,744 183,846 249,103 272,351 340,456 481,921	2,020,396 441,408 16,106 86,242 126,834 168,345 215,394 237,944 237,944 297,322 430,801	1,352,550 213,488 11,925 60,340 93,302 136,889 164,577 202,153 220,153 220,153 220,983	70.05.05.05.05.05.05.05.05.05.05.05.05.05	90.55 90.55 90.55 90.55 91.68 86.55 877.4 897.3	60.6 46.6 67.0 63.6 63.6 64.5 74.5 77.2 47.5 47.5
SOUTHERN STATES All Years All Years 1910–1914 1915 1916 1917 1918 1919 1920	1,413,000 1,179,406 9,211 18,145 22,169 37,299 44,241 26,282 44,644 31,603	518,668 458,606 2,434 3,961 4,569 7,834 10,266 12,732 10,192	498,333 441,408 2,264 3,779 4,544 7,596 7,636 9,391 12,528 9,187	239,921 213,488 653 931 2,939 6,293 4,681 1,554 2,699	36.7 38.9 28.9 20.6 21.0 118.3 32.5 32.5	96.1 96.2 93.4 99.5 97.0 94.6 91.5 98.4	46.3 28.6 28.6 64.3 80.3 80.3 80.3 4.2 2.2 4.3

	ars 309,439 190,611 194,772 155,951 61.6 91.7 81.8 63,062 38,026 33,678 24,559 60.3 88.5 64.6 62,042 36,582 33,077 28,811 58.4 90.4 78.8 75,779 46,051 42,739 40,738 60.8 92.8 88.5 31,314 23,636 22,057 20,604 75.5 93.3 87.2 20,350 14,537 13,534 12,962 71.4 93.1 89.2 28,890 15,719 14,435 13,889 55.6 95.1 89.6	949,398 581,078 520,603 385,627 61.3 89.6 66. 5,321 2,907 2,562 578 54.6 88.1 19.6 83,086 52,951 48,815 34,850 63.7 92.2 65. 131,520 85,235 82,461 57,534 64.8 96.7 67. 169,531 107,449 94,176 71,078 63.5 87.6 60. 175,201 98,577 67,160 50,427 57.7 87.1 70 134,439 77,537 67,160 67,625 54,682 64.3 86.0 69.6	are 420,807 343,738 291,429 215,820 81.7 84.8 62.8 10,490 6,922 5,894 4,208 66.0 85.1 60.8 50,036 31,318 27,250 21,456 62.6 87.0 68.5 109,337 83,475 73,901 61,276 76.4 88.5 73.4 250,944 222,023 184,384 128,880 88.5 83.0 58.0	ars 678,986 598,661 535,259 355,231 88.2 89.4 59.3 20,865 12,450 11,280 10,694 59.7 90.6 85.9 7,645 7,358 6,752 4,018 96.2 91.8 54.6 54,373 52,479 46,285 42,952 96.5 88.2 81.8 118,754 103,022 85,631 64,006 86.8 83.1 62.1 125,554 117,373 101,690 91,474 93.5 86.7 78.0 162,606 150,645 128,459 113,331 92.6 45.3 75.2 189,183 155,334 155,334 155,162 90.0 18.5 18.5
W 1	W EST INDIES All Years 1915 1916 1918 1920 1921	CENTRAL AMERICA All Years 1914 1915 1916 1917 1918 1920 1920 1921	South America All Years 1918 1919 1920 1921	Тнв Ельт All Years 1914 1916 1917 1918 1919 1920 1921

TABLE 1—Continued

220	THE ROCKEFELL	ER FOUNDATION	
Per Cent Given Two or More Treat- ments	27.4 22.5 91.9 58.8	18.2 18.2 30.9 30.8 28.7 100.0	2.0 1.1 68.7 33.1 17.9
Per Cent Given One Treat- ment	988.55 99.55 99.9 85.3	75.6 75.6 98.9 99.0 90.1	87.0 86.9 100.0 68.6 85.0
Per Cent Found Infected	56.2 58.7 8.3 111.7 16.7 55.3	18.3 18.5 .6 61.1 62.0 24.6 39.7	32.9 34.6 25.1 6.6 9.4
Persons Given Two or More Treat- ments ²	13,370 9,857 42 79 150 1,227 2,150	1,614 1,614 14,251 14,023 107	872 475 316 56 25
Persons Given One Treat- ment ¹	48,114 43,520 47 79 17 1,334 3,117	6,705 6,702 3 45,552 45,095 336 121	38,611 37,916 116 119
Persons Found Infected	48,852 43,718 47 79 11,335 3,656	8,865 8,863 3 46,058 45,564 45,564 121	44,404 43,635 460 169 140
Persons Examined	86,995 74,473 564 675 102 4,574 6,607	48,483 47,983 500 75,341 73,518 1,518 305	134,855 128,991 1,833 2,541 1,490
Division, Country, and State	SOUTHERN STATES Alabama All Years 1910-1914 1917 * 1918 * 1920 1920	Arkansas All Years 1910–1914 1918 ³ Georgia All Years 1910–1914 1919 1920 ³	Kentucky All Years 1910–1914 1915* 1920 1921

				-			
Louisiana							
All Years	74.368	39.342	38.556	14.858	52.9	0 86	37.8
1910-1914	68,165	37,720	37,225	14,524	55.3	2 86	38.5
19143	2,568	879	876	324	34.2	98.5	36.9
19183	1,161	208	55		17.9	26.4	
1921	2,474	535	400	10	21.6	74.8	1.9
Mississinni							
All Years	280,707	109,809	108,323	74,496	39.1	98.6	8.29
1910-1914	184,944	75,813	74,598	58,687	41.0	98.4	77.4
1915	4,414	1,422	1,410	53	32.2	99.2	3.7
1916	3,780	1,466	1,455	1,182	38.8	99.2	9.08
1917	14,874	4,348	4,223	4,223	29.2	97.1	97.1
19183	8,468	4,084	4,069	3,541	48.2	9.66	86.7
1919	16,036	8,479	8,471	6,461	52.9	6.66	76.2
1920	31,198	9,730	9,720	42	31.3	6.66	4.
1921	17,043	4,467	4,377	307	26.2	0.86	6.9
North Carolina							
All Years	337,179	112,639	106,828	60,264	33.4	94.8	53.5
1910-1914	300,457	104,279	99,075	57,538	34.7	95.0	55.2
19143	4,837	1,429	1,321	294	29.5	92.4	20.6
19153	3,405	868	805	228	26.4	89.3	25.4
1917	9,048	2,057	1,984	1,149	22.7	96.5	55.9
1918	18,431	3,503	3,272	186	19.0	93.4	28.5
1920	728	. 538.	142	:	32.7	59.7	:
1921	273	235	232	89	86.1	98.7	28.9
South Carolina							
All Years	101,442	47,696	45,812	22,853	47.0	0.96	47.9
1910-1914	81,311	42,677	41,751	21,413	52.5	8.76	50.2
19143	840	06	31	4	10.7	:	
19153	3,581	721	648	230	20.1	89.9	31.9
1916	6,665	1,991	1,980	1,206	29.9	99.4	9.09

TABLE 1—Continued

Persons Examined
931 4,966 2,268 880
81,582 74,997 1,172 1,217 1217 127 378 608 608
89,482 63,376 2,801 7,084 11,025 3,044 2,115

				-			
Virginia							
	102.516	18.745	18.660	16.395	8	2 00	87 5
1910-1914	81 101	17,137	17 057	15 041	91 1	00.20	03.0
1017 1017	066	36	36	10,01	11.0	0.66	0.00
H101	200	25	000	0.0	7.0		
1915	5,740	344	343	84	9.2	99.7	24.4
1916	7,706	493	493	171	6.4	100.0	34.7
1917	4,873	195	195	146	4.0	100.0	74.9
1918	2.923	68	85	21	3.0		
1919	238				4		:
1920 3	307	-	-		. 01	:	:
1921	572	449	449	' :	78.5	100.0	: :
West Indies							
Antiona							
	18.599	2.919	2.634	2.566	15.7	00 0	87.0
19163	7.477	9,990	9,054	9.031	000	00	1:0
19173	11,199	000	100,0	100,0	0.0	1.70	77.1.
	771,11	nen	200	200	7.0	04.1	0.11
British Guiana							
All Years	71,322	44,073	39,906	35,394	61.8	90.5	80.3
1915	21,070	13,135	11,903	10,039	62.3	9.06	76.4
1916	18,498	9,808	8,263	6,225	53.0	84.2	63.5
1917	16,044	9,508	8,906	8,722	59.3	93.7	91.7
1918	11,719	8,797	8,125	7,000	74.5	03.7	00.2
19193	3,001	2,805	2,650	202,6	75.5	0.10 0.10	86.6
Dateh Gariana	-0060	201	2001	2001		0.10	2.50
All Vears	18 494	676.91	15 544	14 702	9 00	00 7	6 8 3
1916	4411	3,000	3,667	3.414	88.4	04.0	27.7
1917	13,159	12,045	11 133	10,664	20.10	93.4	. ×
1921 3	924	817	744	714	28.8	91.1	27.5
Grenada		;				•	
	33.164	22.120	20 571	15 650	65 2	9 00	20 8
101	20000	10 680	11,500	0000	7.00	01.10	20.00
1016	250,02	700,71	270,11	9,004	03.1	91.1	03.7
0161	2,312	4,220	4,147	2,950	9.6	98.1	69.8
1917	7,810	5,242	4,905	4,636	67.1	93.5	88.4
	_	-					

TABLE 1—Continued

_			
Per Cent Given Two or More Treat- ments	83.4 83.2 81.8 85.4	78.2 49.1 81.5 86.7 66.2 91.0 95.2	89.2 93.2 89.9 87.4 90.6
Per Cent Given One Treat- ment	90.1 86.7 92.1 89.3	95.6 92.6 94.2 96.8 98.1 98.1 98.1 8.2	93.3 94.9 92.3 92.6
Per Cent Found Infected	32.4 54.6 28.5 31.5	60.3 56.0 38.9 66.5 66.5 74.7 71.5 71.5	58.2 43.9 54.2 64.0 85.5
Persons Given Two or More Treat- ments ²	7,129 1,291 3,203 2,635	17,661 2,177 1,904 2,653 2,653 2,364 4,331 2,164	11,383 1,562 3,653 5,303 865
Persons Given One Treat- ment ¹	7,705 1,346 3,605 2,754	21,589 4,106 2,201 2,962 2,892 2,547 4,656 2,225	11,905 1,590 3,748 5,683 884
Persons Found Infected	8,552 1,552 3,915 3,085	22,572 4,436 2,336 3,060 3,126 2,597 4,743	12,758 1,676 4,062 6,065 955
Persons Examined	26,397 2,842 13,748 9,807	37,436 7,924 6,003 4,601 5,004 4,350 6,373 3,181	21,915 3,822 7,494 9,482 1,117
Division, Country, and State	Jamaica All Years 1919 ³ 1920 ³ 1921	St. Lucia All Years 1915 1916 1917 1918 1919 1920 1921	St. Vincent All Years 1915 1916 1917

Trinidad All Years 1915 4 1916 1917 1918 1919 1920	82,112 10,204 13,447 13,561 13,474 9,167 8,769 13,490	60,855 6,127 10,021 9,441 10,828 7,493 7,493 7,499 9,536	54,918 4,527 8,997 8,573 10,106 6,982 7,013 8,720	51,376 2,717 2,717 8,634 8,225 9,771 6,799 6,861 8,369	747 60.0 60.0 60.0 60.0 60.0 60.0 7.0 7.0 7.0 7.0 7.0	90 733.9 89.8 99.8 933.3 94.7 4.7	444 46.2 46.2 47.0 47.0 87.0 87.0 87.0 87.0 87.0 87.0 87.0 8
Central America Costa Rica 1915 1916 1917 1918 1919 1920	303,106 30,297 40,579 48,488 56,371 64,371 30,575 32,425	158,358 19,401 22,608 29,940 29,872 9,700 16,939	146,622 18,816 22,037 28,909 27,487 26,551 8,1659	101,802 12,152 9,899 19,180 19,154 22,798 6,368 12,251	52.3 64.0 55.7 61.7 53.0 53.0 52.2	2.6 97.0 97.5 96.6 91.9 84.2 86.5	64.3 62.6 62.6 64.1 64.1 76.3 72.3
Guatemala All Years 1915* 1916 1917* 1919 1920 1921	201,250 25,587 39,596 12,934 32,861 44,495 21,460 24,317	131,558 15,001 26,665 7,095 22,299 28,752 12,805 18,941	117,380 13,783 25,961 6,693 19,950 25,283 11,429	106,283 11,851 23,618 6,518 19,057 23,639 10,402 11,198	65.4 58.6 67.3 67.9 67.9 64.0 77.7	89.2 91.9 97.4 94.3 89.5 87.9 87.9	80.8 79.0 88.6 91.9 85.5 82.5 81.2 59.1

TABLE 1—Continued

Per Cent Given Two or More Treat- ments	51.1 12.1 12.2 12.2 12.2 12.3 12.3 13.3 14.1 16.3 16.3 16.3 16.3 16.3 16.3 16.3 16
Per Cent Given One Treat- ment	887299988899999999999999999999999999999
Per Cent Found Infected	76777777777777777777777777777777777777
Persons Given Two or More Treat- ments ²	45,010 1,166 5,388 9,288 9,286 1,657 10,880 10,820 10,820 11,126 9,537 8,313 4,009 2,718 64,082 1,501 1,126 1,661 1,67
Persons Given One Treat- ment ¹	78,869 1,298 18,3620 13,670 13,670 13,670 11,716 11,812 8,353 1,866 11,812 8,353 11,812 8,353 11,812 8,353 11,812 8,353 11,812 8,353 11,812 8,353 11,812 11,812 8,353 11,604 11,180 11,180
Persons Found Infected	88,036 1,659 1,659 15,016 15,016 15,820 25,272 12,774 16,890 14,088 13,656 13,450 10,050 4,107 10,050 10,050 10,050 10,050 2,696 7,937 7,937 7,937 10,050 10,050 10,050 2,696 7,937 10,050 10,050 10,050 2,696 10,050 10,05
Persons Examined	129,780 12,192 12,829 33,781 19,786 12,246 33,128 15,818 15,818 16,676 16,676 16,185 16,185 16,185 16,185 16,185 16,185 16,185 16,185 17,307 18,283 18,422 18,4328 18,
Division, Country, and State	Nicaragua All Years 1916 * 1916 * 1916 * 1917 1918 1919 1920 1914 * 1915 1918 1919 1920 1921 Salvador All Years 1918 1919 1921 Salvador 1921 1918 1919 1920 1920 1920 1921

South America Brazil							
All Years	375,568	300,932	250,684	179,501	80.1	83.3	59.6
1918 •	10,490 50,036	31,318	27,250	21.456	00°.0	85.1 87.0	86.88 8.88
1920	102,474	77,432	68,207	56,923	75.6	88.1	73.5
1971	217,000	100,400	143,000	*16'08	7.10	0.00	6.26
Colombia Roth Vears	45 239	42 806	40 745	36 310	9 70	95.2	8 78
1920 3	6,863	6,043	5,694	4,353	88.1	94.2	72.0
1921	38,376	36,763	35,051	31,966	95.8	95.3	87.0
THE EAST							
Australia 4	700 00		1	007	t	,	2
Both rears	5,008	2,193	2,075	1,009	7.7	9.86	9.86
1921	33,216	1,843	1,730	1,264	5.5	93.9	68.6
Borneo							
19213	11,337	10,568	10,568	9,951	93.2	100.0	94.2
Ceylon					,		
	384,099	372,587	319,698	297,973	97.0	85.8	80.0
1916 3	7,645	7,358	6,752	4,018	96.2	91.8	54.6
1917	42,828	41,613	35,675	33,440	97.2	85.7	80.4
1918	61,287	59,448	50,374	47,181	97.06	84.7	79.4
1919	107,190	103,974	88,602	84,712	97.08	85.2	81.5
1920	143,482	139,177	117,337	112,089	97.0	84.3	80.5 10.5
1921	21,667	21,017	20,958	16,533	97.0	99.7	78.7
China							,
Both Years	14,529	8,493	6,542	2,669	58.5	77.0	31.4
1918	12,504	7,556	5,694	2,519	60.4	4.00	33.3
GYGY	650,4	100	0.10	207	±0.€	90.00	10.0

TABLE 1-Continued

	1			3			
Division, Country, and State	Persons Examined	Persons Found Infected	Persons Given One Treat- ment ¹	Persons Given Two or More Treat- ments ²	Per Cent Found Infected	Per Cent Given One Treat- ment	Per Cent Given Two or More Treat- ments
Egypt 1914	20,865	12,450	11,280	10,694	59.7	9.06	85.9
Fiji Both Years 1917 ³ 1918 ³	6,624 3,434 3,190	5,975 3,088 2,887	5,780 3,010 2,770	5,551 2,877 2,674	90.2 89.9 90.5	96.7 97.5 95.9	92.9 93.2 92.6
Seychelles All Years 1917 3 1918 1919 1920 3	30,912 8,111 10,475 10,801 1,525	24,717 7,778 9,113 6,924 902	23,826 7,600 8,671 6,702 853	22,537 6,635 8,449 6,612 841	80.0 95.9 87.0 64.1 59.1	96.4 97.7 95.1 96.8 94.6	91.2 85.3 92.7 95.5 93.2
Siam All Years 1918 1919 1920 •	172,390 31,298 5,538 12,591 122,963	161,678 24,018 5,538 10,216 121,906	155,490 18,122 5,538 9,924 121,906	2,247 3,183 56 1,008	93.8 76.7 100.0 81.1 99.1	96.2 75.5 100.0 97.1	2.6 13.3

1 One treatment removes from 75 to 90 per cent of worms; see page 216.

1 Two treatments remove from 88 to 95 per cent of worms; see page 216.

1 Rapes part-year effort only.

1 Stapes of Brazil and Australia not indicated separately.

2 Treatment administered without preliminary diagnosis. Extensive study had previously demonstrated practically every person to be infected.

TABLE 2: Expenditures of the International Health Board for the

111212 2. Dependences of the International Iteam Board for the				
ACTIVITY, STATE, AND COUNTRY	July 1, 1913 Dec.31, 1914	1915	1916	1917
Grand Total	\$157,731.08	\$333,461.91	\$506,087.48	\$578,367.75
RELIEF AND CONTROL OF HOOKWORM DISEASE COUNTY HEALTH WORK. MALARIA CONTROL YELLOW FEVER CONTROL TUBERCULOSIS IN	93,202.74	234,592.13	306,574.04 54,496.97 41,863.17	182.95 39,978.58
FRANCEPublic Health Edu-		• • • • • • •	• • • • • • • • • • • • • • • • • • • •	51,856.24
PUBLIC HEALTH LABORA-		• • • • • • •	9,256.74	12,376.63
TORY SERVICE PHILIPPINE HOSPITAL SHIP		25,000.00	• • • • • • •	• • • • • • •
INVESTIGATION OF SEW- AGE DISPOSAL AT		20,000.00	• • • • • • •	•••••
RURAL HOMES FIELD STAFF SALARIES, EXPENSES, ETC., NOT PRORATED TO SPE-			664.39	5,359.11
CIFIC BUDGETS	15,351.20	9,877.95	4,687.45	9,232.30
Miscellaneous	15,138.35	15,057.65	27,628.35	
Administration	34,038.79	48,934.18	60,916.37	61,857.66
RELIEF AND CONTROL OF HOOKWORM DISEASE Southern States¹ West Indies Central America South America The East Miscellaneous	93,202.74 	234,592.13 89,565.64 52,393.83 55,379.47 37,253.19	306,574.04 47,565.09 88,845.12 88,123.29 4,779.77 77,260.77	53.446.11 87,764.12 98,483.25 43,309.16
Southern States:1		89,565.64	47,565.09	
Alabama		4,343.33		1,235.97
Arkansas		99 999 50		2,462.59
Georgia Kentucky		22,822.59 9,766.49	4,866.63	2,436.95 2,200.00
Louisiana		529.38	1,813.19	1,278.66
Mississippi		11,719.14	8,786.77	9,223.36
North Carolina		3,026.99	3,282.34	8,548.71
South Carolina		5,872.56		
Tennessee		11,889.72	5,797.57	
Texas		8,175.55		
	1	1		

¹In September, 1917, the hookworm work in the Southern States began to be absorbed in the being longer in some states than in others, it was not possible to announce until the end of 1920 regular functions, responsibility for all efforts directed toward the relief and control of hookworm

Years 1913-1914 to 1921, Inclusive, Covering All Activities

1918	1919	1920	1921	Total
\$1,121,862.86	\$1,436,355.00	\$1,658,572.61	\$1,701,185.96	\$7,493,624.65
457,953.94 2,494.53 26,489.29 46,639.17	509,091.99 2,439.25 34,965.08 94,526.42	621,520.98 8,182.77 133,929.02 139,757.40	457,486.99 167,765.19 150,551.39 239,057.53	3,050,411.30 181,064.69 440,410.33 571,187.72
433,030.43	602,775.78	518,013.51	359,540.31	1,965,216.27
36,642.82	38,367.71	68,373.54	89,094.44	254,111.88
			16,109.70	16,109.70
12,500.00	6,500.00			44,000.00
4,288.01	778.60			11,090.11
5,345.82 23,034.17 73,444.68	21,701.87 46,901.63 78,306.67	26,074.89 51,248.30 91,472.20	38,936.95 59,652.90 122,990.56	131,208.43 256,853.11 571,961.11
457,953.94 87,284.58 57,800.06 113,545.86 97,031.00 97,932.47 4,359.97	509,091.99 110,860.17 48,457.24 111,684.19 157,555.86 80,014.39 520.14	621,529.98 136,019.06 61,857.73 98,303.98 206,486.22 113,472.55 5,381.44	457,486.99 15,730.39 85,541.60 77,920.73 150,422.24 121,805.46 6,066.57	3,050,411.30 540,471.04 521,367.03 662,993.31 659,584.25 632,117.94 33,877.73
87,284.58 5,922.09 2,784.41 5,418.95 2,064.97 1,317.93 9,427.52 15,775.89 13,870.12 6,642.20 9,362.85	110,860.17 5,283.74 	136,019.06 17,256.71 	15,730.39	540,471.04 34,041.84 5,247.00 39,808.09 37,475.52 6,309.34 75,639.72 55,020.97 65,318.91 54,649.32 69,784.43

programs of the rapidly developing county departments of health. The period of transition that in all the states the county health departments would henceforth assume as one of their and other soil-borne diseases.

TABLE 2: Expenditures of the International Health Board for the

ACTIVITY, STATE, AND COUNTRY	July 1, 1913 Dec. 31,1914	1915	1916	1917
RELIEF AND CONTROL OF HOOKWORM DISEASE— Continued				
Southern States—Cont'd Virginia	s	\$6,622.97	\$7,403.71	\$6,337.15
Administration County Dispensary				
Work in the South		4,796.92		
Resurveys				
West Indies:	38,707.33	52,393.83	88,845.12	87,764.12
Antigua	3,780.06	1,738.23	9,316.68	4,758.87
Barbados (survey) British Guiana ¹ Cayman Islands	9,711.36	13,300.06	1,651.31 18,554.45	19,231.23
(survey) Dutch Guiana 1		3,260.93	11 670 46	1,795.16
Grenada	7,003.76	10,593.37	11,672.46 $10,154.65$	19,168.40 7,778.80
Jamaica				
Porto Rico Santo Domingo				•••••
(survey) St. Lucia	4,742.30	6,048.76	6,295.20	6,865.60
St. Vincent	4,335.18	4,834.00	6,825.15	9,384.18
Tobago (survey)				1,072.22
$\begin{array}{cccc} \operatorname{Trinidad} \dots & \dots & \dots & \dots \\ \operatorname{Administration} \dots & \dots & \dots \end{array}$	9,134.67	8,242.19 4,376.29	15,104.04 9,271.18	10,898.37 6,811.29
Administration		4,510.25	9,211.10	0,011.29
Central America: British Honduras	19,552.54	55,379.47	88,123.29	98,483.25
(survey)	9,174.60	16,913.06	4,273.47	21,752.31
Costa Rica Guatemala	185.53	10,432.69	18,089.98 11,954.29	13,346.70
Nicaragua	375.00	7,587.80	18,430.69	19,418.74
Panama	9,817.41	18,828.55	24,449.62	22,881.75
Salvador			10,925.24	21,083.75
Administration		1,617.37		
South America:			4,779.77	43,309.16
Brazil			4,779.77	43,309.16
Colombia				

¹ For administrative reasons British and Dutch Guiana, although on

INTERNATIONAL HEALTH BOARD 233

Years 1913-1914 to 1921, Inclusive, Covering All Activities—Cont'd

1918	1919	1920	1921	Total
\$5,947.86 8,749.79	\$10,012.42 10,577.32	\$14,965.17 6,032.20	\$	\$51,289.28 25,359.31
			15,730.39	4,796.92 15,730.39
57,800.06	48,457.24	61,857.73	85,541.60	521,367.03
				19,593.84
16,504.11	9,984.28	486.37	1,281.02	1,651.31 89,052.88
4,389.11	613.23	570.34	12,917.66	1,795.16 52,592.13
$1,833.74 \ 3,937.85$	9,832.48	18,400.09	16,949.24	37,364.32 49,119.66
		7,823.35	18,290.86	26,114.21
8,152.28 6,383.25	8,109.32	1,077.07 11,444.57	8,545.88 17,489.50	1,077.07 60,203.91 49,251.26
				1,072.22
12,301.48 $4,298.24$	15,293.43 $4,624.50$	$ \begin{array}{c c} 16,016.71 \\ 6,039.23 \end{array} $	10,067.44	86,990.89 45,488.17
113,545.86	111,684.19	98,303.98	77,920.73	662,993.31
21,330.40	20,492.01	20,219.60	14,061.66	4,273.47 142,033.62
20,816.27	19,514.73	17,126.43	15,362.58	108,739.22
22,454.30	26,164.44	18,745.12	21,479.43	134,655.52
24,312.26	18,565.05	20,061.02	23,496.22	162,411.88
17,573.90 7,058.73	17,162.10 9,785.86	14,973.80 7,178.01	3,520.84	85,239.63 25,639.97
97,031.00			150 422 24	•
97,031.00	157,555.86 155,430.38	206,486.22 193,560.95	150,422.24 131,787.27	659,584.25 625,898.53
31,001.00	2,125.48	12,925.27	18,634.97	33,685.72

the mainland of South America, are considered West Indian colonies.

TABLE 2: Expenditures of the International Health Board for the

ACTIVITY, STATE, AND COUNTRY	July 1, 1913 Dec. 31, 1914	1915	1916	1917
RELIEF AND CONTROL OF HOOKWORM DISEASE Continued The East:	\$19,466.66	\$37,253.19	\$77,260.77	\$84,912.45
Uncinariasis Com-		407,200117	4,2 00	40-,722020
mission to Orient.		15,504.31	19,406.36	16,572.64
Australia				
British North Bor-				4
neo				• • • • • • • •
British Solomon Is-	i			
lands (survey)			61.505.64	00.040.00
Ceylon		2,073.07	21,585.84	30,340.00
China				3,981.58
$egin{array}{c} ext{China} \dots & \dots $	19,466.66	6,608.12		3,301.00
Fiji	19,400.00	0,000.12	3,386.37	5,776.92
Java (survey)			327.66	0,110.02
India (survey)				
(= , = j, ; ; ; ; ; ;				
Mauritius (survey)				
Papua and Queens-	}			
land				4,074.84
Seychelles Islands		589.06	3,933.29	7,409.69
Siam		10.470.00	6,147.52	6,458.57
Administration	15 476 31	12,478.63	22,473.73	10,298.21
Miscellaneous:	15,476.21	• • • • • • • •		2,073.40
Research in Life History_of Hook-				
worm Eggs and				
Larvae				
Study of Methods of		*********		
Diagnosing Hook-				
worm Disease				
Conferences, Health			I	
Officers of South-				0.070.40
ern States				2,073.40
Motion Picture Film			i	
on Hookworm				
Disease Lecture Charts		• • • • • • • • • •		
Salvador, Portable				
House and Office.				
Salvador, Loss from	'''''	1		
Earthquake				
Thymol	15,476.21			
Dutch Guiana, Care				
and Storage of			1	
Motor Boat and			i	
Supplies		• • • • • • • • • • • • • • • • • • • •		• • • • • • • •

INTERNATIONAL HEALTH BOARD

235

Years 1913-1914 to 1921, Inclusive, Covering All Activities-Cont'd

1918	1919	1920	1921	Total
\$97,932.47	\$80,014.39	\$113,472.55	\$121,805.46	\$632,117.94
	15,902.95	35,417.41	39,912.29	51,483.31 91,232.65
		3,106.23	7,440.10	10,546.33
36,041.44	32,497.87	33,779.28	1,378.85 23,689.34	1,378.85 180,006.84
12,400.87 5,579.84	12,187.58	7,810.00	498.64 12,496.30	28,570.03 26,074.78 15,241.77 327.66 20,306.30
		5,688.56	12,100.00	5,688.56
18,633.50 8,089.06 13,042.15 4,145.61 4,359.97	8,291.90 7,514.66 3,619.43 520.14	4,643.03 15,850.03 7,178.01 5,381.44	18,429.18 17,960.76 6,066.5 7	22,708.34 32,956.03 67,442.11 78,154.38 33,877.73
			3,618.83	3,618.83
	43.95		500.00	543.95
2,990.76		2,488.71		7,552.87
17.40		2,817.73	1,584.74	4,402.47 17.40
945.35	476.19	75.00		1,496.54
406.46				406.46 15,476.21
	×		363.00	363.00

TABLE 2: Expenditures of the International Health Board for the

ACTIVITY, STATE, AND COUNTRY	July 1, 1913 Dec.31,1914	1915	1916	1917
County Health Work ¹	\$	\$	\$	\$182.95
Alabama Florida				
Georgia				
Kansas				
Kentucky				
Louisiana				
Maryland				182.95
Mississippi				
Missouri				
New Mexico				
North Carolina South Carolina				• • • • • • • •
South Carolina				
Tennessee				
Texas				
Virginia				• • • • • • •
West Virginia Administration				
Malaria Control Southern States:			54,496.97	39,978.58
Alabama			11 104 50	4 076 02
Arkansas Georgia			11,104.58	4,276.23
Louisiana				
Mississippi			43,392.39	35,702.35
Missouri				
North Carolina				
South Carolina				
Tennessee				
Texas				• • • • • • •
Virginia Administration				
				
Foreign Countries:				
Ecuador				
Argentina Brazil				
Nicaragua				
Porto Rico				
Miscellaneous: Conference of Malaria Workers				

¹ In September, 1917, the hookworm work in the Southern States began to be absorbed in the being longer in some states than in others, it was not possible to announce until the end of 1920 regular functions, responsibility for all efforts directed toward the relief and control of hookworm

Years 1913-1914 to 1921, Inclusive, Covering All Activities-Cont'd

1918	1919	1920	1921	Total
\$2,494.53	\$2,439.25	\$8,182.77	\$167,765.19	\$181,064.69
			18,231.35 237.75	18,231.35 237.75
			4,338.17	4,338.17
		4,494.00	6,316.99	10,810.99
		1,101.00	16,316.41	16,316.41
			5,618.28	5,618.28
0.404 52	0.064.05		′	6 704 20
2,494.53	2,264.25		1,762.59 $15,652.72$	6,704.32 $15,652.72$
			600.00	600.00
		957.04	10,837.52	11,794.56
		301.01	14,413.38	14,413.38
			17,651.97	17,651.97
				•
			14,686.42	14,686.42
			12,765.65 $13,972.74$	12,765.64 $13,972.74$
	175.00	2,731.73	4,164.56	7,071.29
	175.00	2,751.75	10,198.70	10,198.70
26 400 00				
26,489.29	34,965.08	133,929.02	150,551.39	440,410.33
		8,906.92	7,650.06	16,556.98
4,749.02	13,505.66	7,048.90	4,777.15	45,461.54
		1,230.86		1,230.86
23.23.23.22	20112122	30,699.94	22,929.88	53,629.82
21,740.27	21,167.37	27,537.43	21,185.61	170,725.42
			1,471.37	1,471.37
		7,526.13	18,676.30	26,202.43
		13,942.74	13,321.90	27,264.64
		1,969.94	1,512.56	3,482.50
		11,472.34	10,347.23	21,819.57
		5,284.84	831.65	6,116.49
• • • • • • • • • • • • • • • • • • • •		6,032.20	10,198.68	16,230.88
• • • • • • •		4,595.59		4,595.59
			5,661.02	5,661.02
	292.05	405.00	0.000 51	292.05
		425.66	6,662.51	7,088.17
•••••		5,445.18	24,914.84	30,360.02
		1 810 85	245 00	2.055.25
<u> </u>		1,810.35	245.00	2,055.3

programs of the rapidly developing county departments of health. The period of transition that in all the states the county health departments would henceforth assume as one of their and other soil-borne diseases.

TABLE 2: Expenditures of the International Health Board for the

ACTIVITY, STATE, AND COUNTRY	July 1, 1913 Dec. 31, 1914	1915	1916	1917
Malaria Control— Continued Miscellaneous—Cont'd Study of Source of Blood Meals of Anopheles				
Mosquitoes	\$	\$	\$	\$
Yellow Fever Control Yellow Fever Com-			41,863.17	9,344.03
mission East Coast of Brazil			41,863.17	7,727.74
and Caribbean				1,616.29
Brazil Ecuador				
Guatemala				
Mexico and Central America Peru Salyador				
Epidemic Work				
TUBERCULOSIS IN FRANCE				51,856.24
Work Department of Or-				18,671.74
ganization Public Health Divi-				
sion Central Administra-			• • • • • • • • • •	• • • • • • •
tion Educational Divi-				18,292.10
sion				5,316.39
Medical Division Contingent Fund				9,576.01
Public Health Education Department of Hy-			9,256.74	12,376.63
giene, São Paulo. Institute of Hygiene,				179.59
Czechoslovakia Public Health In-				•••••
stitutes Fellowships				971.85
Adviser in Medical Education				11,225.19

INTERNATIONAL HEALTH BOARD

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Years 1913-1914 to 1921, Inclusive, Covering All Activities-Cont'd

1918	1919	1920	1921	Total
8	\$	\$	\$165.63	\$165.63
46,639.17	94,526.42	139,757.40	239,057.53	571,187.72
	44,271.12	83,717.13		177,579.16
2,897.97 29,473.98 14,267.22	48,396.77 967.82	28,574.98	461.30 1,698.06	4,514.26 461.30 108,143.79 15,235.04
	890.71	3,926.26 23,539.03	156,562.54 80,335.63	156,562.54 80,335.63 4,816.97 23,539.03
433,030.43	602,775.78	518,013.51	359,540.31	1,965,216.27
				18,671.74
		139,364.76	47,281.28	186,646.04
		76,191.46	101,473.08	177,664.54
80,037.65	72,394.12	86,310.57	89,575.04	346,609.48
85,755.19 267,237.59	141,053.34 389,328.32	135,920.64 80,226.08	79,839.90 40,621.01 750.00	447,885.46 786,989.01 750.00
36,642.82	38,367.71	68,373.54	89,094.44	254,111.88
32,788.84	23,582.57	29,929.01	24,727.16	111,207.17
			204.51	204.51
2,353.98	13,118.47	38,409.84	3,466.64 60,696.13	3,466.64 115,550.27
1,500.00	1,666.67			14,391.86

TABLE 2: Expenditures of the International Health Board for the

ACTIVITY, STATE, AND	July 1, 1913	1915	1916	1917
Country	Dec. 31, 1914			
Public Health Education—Continued Medical Commission to Brazil 2 Study of Teaching of Hygiene and Public Health in Med-	\$	\$	\$9,256.74	\$
ical Schools				
Public Health Labora- tory Service United States: Kansas				
Foreign:				
Guatemala Nicaragua	• • • • • • • •			• • • • • • • •
Salvador				
Administration				
Administration				• • • • • • • • • • • • • • • • • • • •
Miscellaneous	15,138.35	15,057.65	27,628.35	18,191.76
Czechoslovakia Pub- lic Health Work Paris Conference on International No-				•••••
menclature of Causes of Death. Compilation of Min-				
ing Sanitary Code Survey Public Health Adminis-				••••••
tration in Massa- chusetts Investigation of				
Powdered Milk				
Medical Commission to Brazil ² Visit of Brazilian			9,256.73	
Scientists to United States British Advisory				
Committee	2,561.36			
Field. Equipment and Supplies Surveys and Exhibits	742.88 11,421.16	15,057.65	18,371.62	2,464.68 13,854.57
Pamphlets and Charts Library	847.86 1,844.12			1,335.66
Express, Freight, and Exchange Refunds which could				536.85
not be credited direct to budget.	-(2,279.03)			

Years 1913-1914 to 1921, Inclusive, Covering All Activities-Cont'd

1918	1919	1920	1921	Total
\$	\$	\$	\$	\$9,256.74
		34.69		34.69
			16,109.70	16,109.70
			2,539.88	2,539.88
			307.50 85.18 984.34 12,192.80	307.50 85.18 984.34 12,192.80
23,034.17	46,901.63	51,248.30	59,652.90	256,853.11
		12,708.81	20,736.31	33,445.12
		615.30	125.98	615.30 125.98
-	26.09	1,467.27		1,493.36
		500.00		500.00
				9,256.73
			7,660.12	7,660.12
				2,561.36
3,000.00 14,970.85	23,434.94 16,870.71	5,996.96 23,528.78	4,982.25 13,437.76	40,621.71 127,513.10
3,999.49	5,499.50	5,873.33	10,153.44	27,709.28 1,844.12
1,063.83	1,070.39	557.85	2,557.04	5,785.96
• • • • • • •				- (2,279.03)

CHINA MEDICAL BOARD

Report of the Director

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To the President of the Rockefeller Foundation: Sir:

I have the honor to submit herewith my report as Director of the China Medical Board for the period of January 1, 1921, to December 31, 1921.

Respectfully yours,

ROGER S. GREENE,

Director.

N

CHINA MEDICAL BOARD

The year 1921, the seventh of the Board's work in China, was marked by the completion of the main buildings of the Peking Union Medical College and the occupation of the hospital and medical school by a nearly complete staff in all the major departments, with three classes under instruction in the medical school proper. is the only institution for which the China Medical Board has thus far assumed complete financial responsibility. It is hoped that it may serve as a model for other medical schools, not in the sense that it necessarily represents the ideal in all matters of organization and construction, nor that it is as yet complete in every respect as a few of the largest institutions in other countries may be said to be complete, but that it presents, in China, a demonstration more nearly adequate than any that has preceded it, of the essential elements of a modern medical school.

The College seeks to point the way by which the future system of Chinese medical education may be adapted as well as possible to the actual conditions in the country. If the hopes of its founders are realized, it will graduate a select group of leaders in medical education, in research, and in public health administration, and a larger number of useful practitioners of medicine and surgery. In addition it will offer to men and women who have graduated from other schools, further training and experience to fit them for posts of greater responsibility in Peking or elsewhere. Organizations engaged in the great work of medical education in China may be interested in watching the progress of the school, and in observing, with profit to themselves, those features of its work which experience shows to have been wisely or unwisely adopted.

In general the other activities of the Board were of much the same nature as in previous years. Aid was continued toward the current expenses of three medical schools wholly or partly under mission control, and a new departure was made in a grant to one purely Chinese school of funds with which to purchase a site for a contemplated new plant. In the field of premedical education, contributions were continued to four colleges, and plans were prepared for some extension of this work so that the supply of prospective medical students might be increased and the medical schools be relieved of the necessity of maintaining preparatory departments of their own.

A few new appropriations were made to mission hospitals to make possible necessary im-

provements in staff and equipment, but the experience of the past few years seems to indicate that the most effective way to aid the hospitals is to improve and extend the facilities in China for the training of doctors, nurses, and technical workers of various kinds who cannot now be found in adequate numbers, in China or abroad, even when the funds for their support are available. It is therefore likely that in aiding individual hospitals in future, chief consideration will be given to those strategically located institutions which can be made to play an important part in the educational program by providing for the post-graduate training of doctors and by maintaining schools for nurses. In such centers there are large possibilities for local support once the professional work is placed on a high level, especially when properly qualified Chinese can be found to share both in the professional work and in the administrative control of the hospital.

Contributions were made to both Chinese and foreign medical associations for the support of the important work which they are doing in the preparation of a unified medical terminology in co-operation with other learned bodies, and in the translation of medical literature; and, finally, the system of fellowships and scholarships for doctors and nurses, both Chinese and foreign, was continued. But with the opening, to graduate

students, of the Peking Union Medical College, a larger proportion of the appointments were for work at Peking than abroad. Hereafter, the fellowships for Chinese will be assigned mainly to the Peking School, only the more advanced graduate students who have shown special promise in actual work in China being sent abroad. Foreign physicians also will be welcomed as graduate students at Peking, and it is hoped that they will make constantly larger use of the facilities there; but, since they have more leisure for study during their periodical furloughs in Europe and America, it is probable that provision will continue to be made for a limited number of fellowships and other grants in aid of their study abroad.

The results obtained from the fellowships have been very gratifying. Nearly all the Chinese medical students aided are now usefully employed in their own country, most of them in connection with medical schools, a few in government service, and some in hospitals, Chinese or foreign. So far as is known, only one is engaged exclusively in private practice, and nearly all are giving their time wholly to institutional work.

Looking back over the past ten years, it is clear that medicine in China has made real progress. The increased effectiveness of medical schools and hospitals, the development of an active Chinese medical association under enlightened leadership, and the growing interest of the Chinese people in Western medicine and public health, are sources of satisfaction to those who hope to see the Chinese people in possession of a scientific, well-rounded, and complete system of medicine.

I. MEDICAL EDUCATION

A. The Peking Union Medical College

In the promotion of modern medicine in a new field such as China, the matter of personnel is naturally the most important factor, for when the need is recognized and qualified doctors and nurses are available, the means can eventually be found to maintain them and to secure the physical equipment which they need to make their work productive. It is obvious that foreigners can play only a very limited part so far as giving actual medical service is concerned; while foreigntrained Chinese doctors and nurses, though they can be very useful in the initial stages, will always be few in number and at some disadvantage because the schools they have attended have not sought to equip them for meeting the special conditions, whether of climate or of social and economic organization, which prevail in China. Therefore the establishment of an institution to provide the requisite training on local soil was logically the first step in the program of the China Medical Board. The efforts of its officers during these first years have accordingly been largely devoted to the reorganization and equipment, on a satisfactory basis, of one such medical school, the Peking Union Medical College.

The College was fortunate in securing among the first members of the new board of trustees which was organized in 1916, Dr. William H. Welch, of Johns Hopkins University, and Dr. Simon Flexner, director of the laboratories of the Rockefeller Institute for Medical Research. Experience in the conduct of medical and general educational work in China has been contributed by representatives of the six British and American missionary societies which had maintained the old Union Medical College from which the new institution has been developed. All of the thirteen trustees have spent some time in China and have first-hand knowledge of the problems to be met.

Since 1915 the College has been supported by annual contributions from the China Medical Board. The budget for the academic year 1921–1922 provides for a gross expenditure, on the school and hospital, of \$1,418,989 Chinese silver currency. The local income from fees and hospital earnings is estimated at \$219,383 Chinese currency. To cover the difference an appropriation of \$600,000 United States currency has been provided.

The finding of a qualified staff and the organization of the medical and pre-medical schools

and the hospital was entrusted to Dr. Franklin C. McLean, the professor of medicine and the first Director of the College. Dr. McLean having resigned the directorship in 1920 to devote himself entirely to the department of medicine, Dr. Henry S. Houghton, formerly dean of the Harvard Medical School of China, was elected to succeed him and was formally inaugurated in September, 1921. No teaching responsibilities are now attached to the directorship, since it has become evident that the administrative duties of the post are so heavy as to require the full time of the director.

Dr. Houghton has been associated with the China Medical Board for the past six years, and has served as acting Director of the Board at New York and as acting Resident Director in China. During the period of construction he had charge of all the work of the school in Peking. Dr. Richard M. Pearce, Director of the Division of Medical Education of the Rockefeller Foundation, was in residence in Peking during the year 1921–1922 in an advisory capacity. In the absence of Dr. Houghton on a short visit to the United States Dr. Pearce acted as Director.

Acknowledgments are due to members of the faculties of many of the best American and British medical schools for assistance given in finding teachers, and in affording, to persons selected for



Fig. 73.—Graduates and students, 1921, Training School for Nurses, Peking Union Medical College

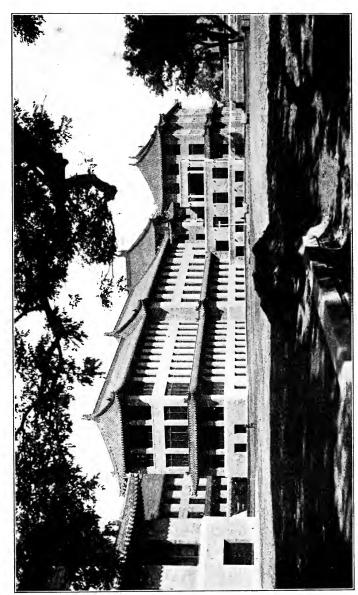


Fig. 74.—Medical-ward building and pathology building, Peking Union Medical College

the staff, opportunities for additional preparation in laboratories and clinics.

The staff of the medical school proper at the end of the year 1921 consisted of seven professors, six associate professors, one assistant professor, and seventeen associates, besides fifteen assistants in all departments. In the pre-medical school there were four assistant professors, five instructors, and seven assistants. Of this teaching staff, forty-seven were Americans or Europeans and forty-three were Chinese, the latter being for the most part men who had studied either in the United States or Great Britain. The higher administrative staff consists of the Director, the superintendent of the hospital, the comptroller, and forty-seven other administrative and technical employes, of whom forty-four are Europeans or Americans and three Chinese. The nursing department of the hospital and the nurse training school include twenty-six European or American nurses and five Chinese graduate nurses trained in the United States. All the regular teaching staff are now on the full-time basis, but this policy may be modified as the number of Chinese physicians and surgeons in Peking who would be qualified to assist in the teaching increases.

In order to lessen the isolation of the staff from scientific progress in the West, provision has been made for visiting professorships under which, every year, one or two leading medical scientists of the United States or Europe are invited to spend from four months to a year at Peking. In 1921 such visiting professorships were held by Dr. A. B. Macallum of McGill University, in physiology, and by Dr. Francis W. Peabody of Harvard University, in medicine. Dr. R. B. Seem, the superintendent of the new hospital for the University of Chicago, has served for a year as superintendent, aiding in the organization of the hospital. The friendly interest of such men, continued even after their return home, has been of great value to the College.

In recent years the number of foreign travelers visiting Peking has much increased, and among them are occasionally men of scientific eminence whose visits have proved very stimulating. More systematic opportunity for renewal of contact with scientific activities at home is afforded by provision for a year's leave of absence, after four years of service, to all members of the medical faculty who continue with the College, full salary and traveling expenses for the round trip being paid. It is hoped to insure to all members of the scientific staff opportunities for private study and research in addition to their teaching and clinical duties.

During these earlier years problems of organi-

zation and the difficulty of finding and training the necessary assistants have naturally absorbed much of the energies of the staff, but in spite of these handicaps a creditable amount of work has already been done. China offers a particularly attractive field for study in many branches of medical science. A beginning is already being made in some promising anthropological studies, and, with the co-operation of numerous individuals and institutions throughout the country, an embryological collection has been started which should furnish the material for some very interesting research. A systematic survey has been begun of the human and animal parasites of China, and there is opportunity for the study of many tropical diseases which are rarely if ever encountered in the West. The full time of one chemist is being devoted to the investigation of Chinese foods, with a view to preparing as soon as possible the best hospital diets for various conditions. At the end of the year the services of this chemist were lent for a short time to the Philippine government for the study of diets for its leper colonies. There has just been assembled the first volume of Contributions from the Peking Union Medical College, Peking, China, containing the work published in 1921. A list of these papers is appended to this report (see page 308).

The requirements for admission to the medical

school are equivalent to those of institutions in the United States prescribing two years of college work in physics, chemistry, and biology after completion of the high school course, but as the high schools in China are still defective, and since it is necessary to give the students a good command of the English language, in which all the medical teaching is done, it has been thought best to extend the preparatory course in these subjects over three years. The first class was admitted to the medical school proper in the autumn of 1919, when the anatomy building was finished, and there were at the end of 1921 three classes under instruction, numbering altogether twenty-two students, eleven in the first year, six in the second, and five in the third. Women are admitted on the same terms as men, but only one woman had been enrolled in the medical school up to that time, though there were several women among the fifty-two students in the pre-medical school. Co-education has thus far involved no difficulties either with the students or the public. Growing recognition of the importance of higher education for women and the lack of money to maintain separate schools for them have led many other institutions to adopt the same policy, the very novelty of which has been an attraction in the present state of Chinese educational thought.

The smallness of the classes during the period of organization has been a real advantage both to the staff and to the students. It has been due in part to the fact that the character of the opportunities offered was not widely known, and partly to the fact that the entrance requirements were considerably higher than those of other schools. The faculty report that the students compare favorably with those in good medical schools in the United States. Their command of English is excellent, and they also have some reading knowledge of either French or German. At present the staff and equipment are planned for a maximum of twenty-five students in each undergraduate class, and it is expected that this limit will be reached in about five years. The course covers four years of formal instruction, with a fifth year of service, as hospital intern or as laboratory assistant, required for the degree. At present the College holds a provisional charter from the Regents of the University of the State of New York, and that body will confer the degrees until an absolute charter has been granted.

Much importance is attached also to graduate teaching, through which it is hoped that the College will be able to contribute directly to the raising of standards in other schools and hospitals. Already a few men with such special training received at the Peking Union Medical College have

been called to positions of greater responsibility in other institutions. For such students special fellowships are provided, which are assigned both to promising Chinese doctors and to foreign medical missionaries. In 1921 there were nineteen Chinese and seventeen foreign doctors holding these fellowships for varying periods of time, some coming for short intensive courses in ophthalmology and roentgenology and others remaining for several months of work in the clinics and laboratories. The average length of stay was three months in the case of foreign doctors and two months in the case of Chinese, but many of the latter had begun their residence shortly before the close of the year, so that these figures do not represent the actual length of the period of study planned. The total number of graduate and special students in residence at the close of 1921, including junior hospital staff and assistants in the laboratories, was seventy-five, of whom fifty-six were Chinese and nineteen foreigners. The school and hospital are therefore in more active use for educational purposes than the small number of undergraduate students would indicate. For the year 1922 special graduate courses in ophthalmology, general medicine, neurology, orthopedic surgery, and roentgenology have been announced. During the summer of 1921 the parasitologist of the school

conducted a well-attended summer course for doctors at Kuling, a resort in the Yangtze valley.

The College has a physical plant somewhat smaller than those of the leading medical schools of the West, but it has the great advantages possessed by too few schools in the United States not only of complete control of its hospital but also of close contact between the clinical and preclinical departments, which are all housed on one site with the buildings connected by corridors. Thus the plan of the buildings recognizes the accepted fact that the hospital is actually as much a teaching laboratory as are the laboratories of anatomy or physiology. The school is conveniently situated in the southeast quarter of the Tartar city on a short street known as San Tiao Hutung.

The exteriors of the new buildings have been planned to harmonize with the great architectural monuments of Peking so far as was permitted by the modern uses to which they were to be put. The green-tiled roofs of Chinese design, with highly decorated eaves; the porticoes with their red columns; and the marble terraces about the school and hospital courts, are modeled after the palaces and temples of Peking. In the case of the auditorium building it has been possible to adhere fairly closely to the classical Chinese designs. This attempt to use the beautiful

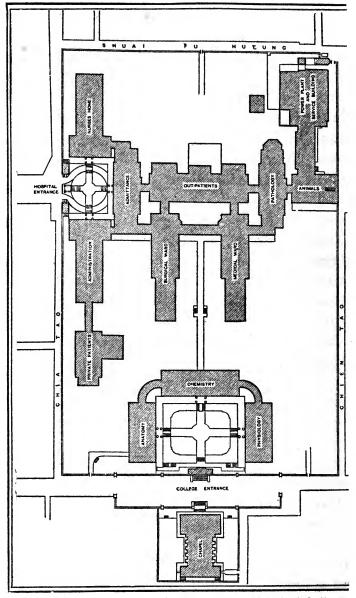
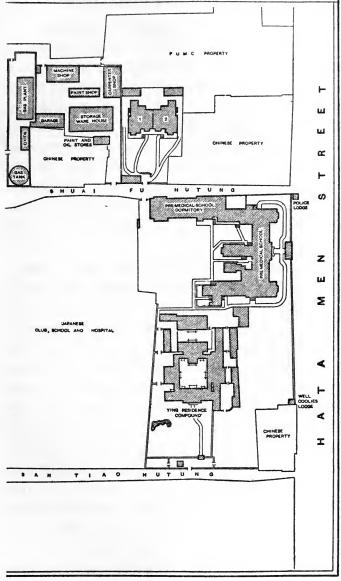


Fig. 75.—General plan of Peking Union Medical College, school buildings

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showing location of college, hospital, and pre-medical

Chinese forms may be regarded as typifying the hope that the school itself may in time become a truly Chinese institution, and that through it Chinese scientists may succeed in adapting Western medical science to the needs of their own country more effectively than foreigners can ever hope to do. It is perhaps appropriate that the dignity of the once-despised medical profession and of the common people whom the hospital is intended to serve, should be symbolized by the adaptation of palace architecture to their uses.

The laboratories of anatomy, physiological chemistry, physiology, and pharmacology are in three buildings forming a court entered directly from the street. The department of anatomy occupies a two-story building forming the west side of the court and containing on the ground floor a lecture room seating fifty persons, a small museum, offices, and private laboratories. On the second floor are the dissecting room, a large students' laboratory for microscopic anatomy, and smaller rooms for individual workers and technicians. The basement contains a large refrigerator room for storage of cadavers, tanks, preparation rooms, animal room, dark room, shop, and storerooms. More storage space is provided in the attic. The physiology building on the west side is of the same size, the ground floor containing the students' laboratory for pharmacology, a lecture room, and the necessary offices, small laboratories, and service rooms for this department. The second floor is given up to physiology offices and laboratories, including an operating suite. In the basement are a small machine shop, rooms for animals, storerooms, and a workshop with dark room for the X-ray department.

A three-story building on the north side of the court has on the ground floor the administrative offices of the College, and the library and reading rooms. The second floor contains the laboratories and lecture room for physiological chemistry, a centrifuge room, and a small operating room. The third floor, which is intended for the future expansion of the chemical laboratories, is now used as a dormitory for male nurses. The basement contains part of the library stacks and storerooms. Opposite the main school court is located an auditorium with students' reading rooms and social rooms attached, which is the headquarters of the department of religious and social work. The main hall is used for chapel exercises, popular lectures, and entertainments of various sorts.

North of the laboratory group and connected with it by a long corridor, under which runs a tunnel carrying the water, steam, electrical,

compressed air, and brine lines, is the hospital group, with which is connected the pathology building. The hospital has an entrance of its own from the west, with a smaller court having the nurses' home on the north and the hospital administration building on the south, with offices on the ground floor and in the basement, and house officers' quarters on the second floor. In the basement are also the mechanotherapy and hydrotherapy suites. A three-story building facing the gate contains, on the ground floor, part of the outpatient department through which all public-ward patients enter the hospital. The upper floors are given up to gynecological and obstetrical wards and a small ward for children. In the basement are bathrooms for newly admitted patients, emergency operating and dressing rooms, and observation wards.

Back of this building, and connected with it on three floors, is a large four-story building, facing south, the first floor of which contains the consultation and treatment rooms for general medicine and surgery, of the outpatient department. Connected with it in the basement are the eye and ear, nose, and throat clinics. On the second floor there is a large X-ray suite, the clinical laboratories of the department of medicine, the laboratory of the department of otolaryngology, a clinical lecture room, and two small classrooms.



Fig. 76.—A part of the academic procession at the dedication of the Peking Union Medical College, September 19, 1921

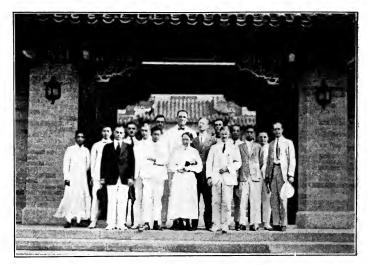


Fig. 77.—Graduate students attending summer course in roentgenology at Peking Union Medical College in 1921



Fig. 78.—Entrance court, from anatomy and physiological chemistry buildings, Peking Union Medical College

The third floor contains the offices and research laboratories of the departments of medicine, surgery, obstetrics, and ophthalmology. On the fourth floor are the surgical operating rooms, four in number, with the necessary auxiliary rooms and a small suite for dental work. The main hospital kitchens and dining rooms are in the basement.

Extending south from this dispensary and laboratory building are the two main publicward buildings, that for medicine to the east and the surgical building to the west. Each block has three floors accommodating twentyfive patients on a floor, the standard unit consisting of one 16-bed ward, one 6-bed room, and three single rooms, with diet kitchen, dining room, linen closet, utility and bathrooms. basements of these buildings provide convenient space for storage and workrooms of different kinds. Private patients are accommodated in a separate pavilion south of the administration building. There are accommodations here for twenty patients on two floors, and one floor is reserved for quarters for women members of the house staff. In the basement are the kitchens for the preparation of European food, and the staff dining rooms. The total capacity of the hospital is 250 beds, but on account of the small number of students and the necessity of building

up the organization slowly, only about 150 beds have been in use thus far.

The department of pathology is in a three-story building connecting on all floors with the medical clinic and laboratories. In the basement are the autopsy and lecture rooms, the morgue, glasswashing room, and storage space. A one-story animal house adjoins it. On the first floor are the laboratories of public health and parasitology, a small museum, the central pathological laboratory for all departments of the hospital, and a large students' laboratory for pathological histology. The second floor contains the offices and private laboratories of the professor of pathology and the associate professor of bacteriology, the students' bacteriological laboratory, and the media room. On the third floor are laboratories intended eventually for pathological chemistry but now used for an investigation of Chinese foods, and the illustration service, including photographic rooms. A part of this floor is cut off for emergency isolation wards for the hospital.

A one-story building opening on the service court in the northeastern corner of the lot contains the receiving rooms for supplies of all kinds for the hospital and medical school, and the large bedding sterilizer. This connects with the power house, in which are located the electric generators, air compressors, pumps for the hot and cold

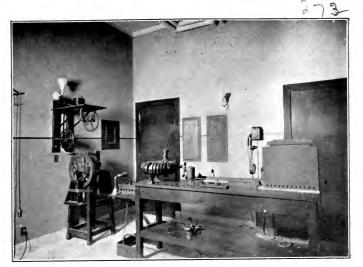


Fig. 79.—Electrocardiograph room in hospital, Peking Union Medical College



Fig. 80.—An operating room in hospital, Peking Union Medical College



Fig. 81.—Laboratory of physiological chemistry, Peking Union Medical College

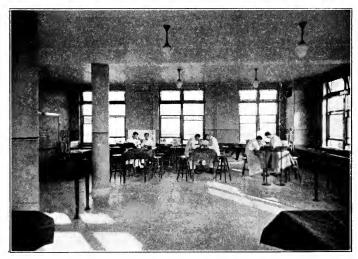


Fig. 82.—Dissecting room, anatomy building, Peking Union Medical College

water, refrigeration plant, et cetera. The buildings are all heated in winter by exhaust steam from the engines. All the water used is pumped from deep wells driven on the college property, as the supply from the municipal water-works is inadequate and extremely expensive. Above the engine room is the laundry equipped with American machinery, and above that are two floors of servants' rooms. As the city of Peking has no public gas plant, and since modern mechanical industries have been little developed there, it has been necessary for the College to develop a small industrial area of its own across a narrow street from the main buildings. Here are located a small gas plant; the main garage; woodworking, metal, and paint shops; a precision shop; and a large storehouse to contain the reserve supplies of all sorts, of which it is necessary to carry a large stock on account of the remoteness of Peking from the markets of the world.

The pre-medical school and students' dormitories are in older buildings on detached property nearby. The College also possesses thirty-six residences for members of the staff, thirty-one of which have been newly built with all modern conveniences. The building of these houses was made necessary by the shortage of residences suitable for use by foreigners. Thus the whole

physical plant is inevitably much larger and more complicated than would be necessary for a medical school of the same size in any large city of the Western world, and this fact adds much to the administrative difficulties and expense of conducting the institution.

It will be noted that the institution does not yet possess a special children's clinic nor institutes for mental and infectious diseases. Though children not suffering from infectious diseases can be received in the present hospital, the lack of suitable provision for the study of mental and infectious diseases is a serious defect that must eventually be remedied, perhaps by affiliation with institutions under Chinese control, of which none that are really satisfactory now exist. This solution would in many respects be the most desirable, as the maintenance of such hospitals, besides adding greatly to the expense, would involve some embarrassing administrative problems with which a foreign institution might find it difficult to deal. The prospects for such cooperation are encouraging. Already arrangements for the care of convalescent children have been made with a Chinese institution in the western hills near Peking; a project is on foot for an eye hospital with which the College department of ophthalmology would co-operate; and Dr. S. P. Chen, an able Chinese physician in

charge of the government isolation hospital, is assisting in the teaching of infectious diseases.

The buildings have been occupied gradually as they have been completed. When the new hospital was finally opened in July, 1921, the clinical work was transferred to it from the old hospital which had been used under the former organization. The attempt has been made to provide the faculty with all the mechanical equipment needed for the best possible work in the laboratories and wards. Electric current, including separate light and power and lowvoltage lines, gas, medium-pressure steam, compressed air, hot and cold water, and refrigeration have as far as possible been supplied at all points where they were required. The wards and the physiological laboratory have permanent connections with the electrocardiograph in the medical laboratories, there are telephone connections throughout the buildings, and electric callsystems have been installed. Besides standard apparatus for teaching and clinical work, a considerable amount of special equipment for research laboratories has been provided.

A library has been collected containing some 22,000 volumes and 450 sets of the most important journals. Since no other large medical libraries exist in China, it has been necessary to make the collection more comprehensive than is

customary in a similar school in the United States, where access can be had to other libraries. There are still some serious gaps, as might be expected in a new library, but nevertheless a very useful working collection has already been formed.

Great importance is attached to the training school for nurses, conducted in the hospital. High-school graduation or its equivalent, and a working knowledge of English, are required for admission, and the regular course extends over four years, including one preparatory year, during which instruction is given in physics, chemistry, and biology in addition to the special subjects required for nurses. By special arrangement, Peking University offers a bachelor's degree to nurses taking a combined course in its arts college and the nurse training school of the Peking Union Medical College. Special classrooms and laboratories for this school are provided in the nurses' home. It is hoped that nurses trained here will be prepared to take positions of responsibility as teachers and supervisors in other schools and hospitals. In 1921 ten pupils were enrolled. Only women are now admitted to the school, but as the supply of female nurses and pupils is very small, a number of male nurses are still employed, under female supervisors, in the men's wards.

The formal opening exercises of the College and the inauguration of the new director, Dr. Henry S. Houghton, were held in Peking during the week extending from September 15 to 22, 1921. Advantage was then taken of the presence of a number of distinguished guests from all over the world to hold a series of scientific meetings and clinics. Meetings of the trustees were held at the same time, to discuss important matters of policy in the light of intimate contact with the staff and the current work of the school. Among the eminent scientists attending the exercises and taking part in the proceedings were:

- Prof. T. Tuffier, Surgeon at the Hôpital de la Pitié, Paris.
- Dr. A. B. Macallum, Professor of Biochemistry at McGill University, Montreal.

Sir William Cecil Smyly, Dublin.

- Dr. R. T. Leiper, Director of the Department of Helminthology, London School of Tropical Medicine.
- Dr. Francis W. Peabody, Associate Professor of Medicine, Harvard Medical School.
- Dr. George E. de Schweinitz, Professor of Ophthalmology, University of Pennsylvania.
- Dr. Florence Sabin, Professor of Histology, Johns Hopkins University.
- Dr. S. S. Goldwater, Director of Mt. Sinai Hospital, New York City.
- Dr. S. Hata, of the Kitasato Institute, Tokyo.
- Professor Mataro Nagayo, of the Imperial University, Tokyo.

Professor K. Shiga, of Seoul, Korea.

- Dr. Wu Lien-teh, of the North Manchurian Plague Prevention Service.
- Dr. S. P. Chen, Medical Superintendent of the Government Isolation Hospital, Peking, and Medical Director of the Central Hospital.
- Sir William Brunyate, K. C. M. G., Vice-Chancellor of the University of Hong Kong.
- Dr. C. W. Wang, University of Hong Kong.
- President Guy Potter Benton of the University of the Philippines.
- Dr. F. G. Haughwout, Professor of Protozoology and Parasitology, University of the Philippines.
- Dr. A. de Waart, Member of Commission on Medical Education, Dutch East Indies, Weltevreden, Java.

The Chinese Government was represented at the formal opening by the Ministers of Education, Foreign Affairs, and the Interior, who made addresses testifying to their appreciation of the purposes of the College and its founders. The Minister of Foreign Affairs paid high tribute also to the work of British and American medical missionaries in China.

On the part of the Chinese public there has been no lack of appreciation of the service rendered by the hospital, such difficulties as have arisen being due to the fact that so many patients have come for treatment that it has been necessary to limit the numbers in order not to interfere with the teaching and other duties of the staff. In general, foreign patients are received only when referred by their physicians.

These restrictions, though they have caused some misunderstanding, are unavoidable if the hospital is to fulfil its primary function as a teaching institution and give its best service to those whom it admits.

Members of the staff have frequently been called upon for public service in emergencies. In previous years they have aided in attending those wounded in civil war, and in combating plague and other epidemics. In 1921, members of the department of medicine assisted in organizing and administering the sanitary work connected with the relief of famine sufferers, and the director of religious and social service had charge of the recruiting of relief workers from all over the country. Diets for the famine sufferers were also planned in consultation with the food chemist of the college. It is evident, therefore, that the College is now a going concern, already making a contribution to the community which it may be hoped will become more significant as time goes on.

B. Aid to Other Medical Schools

While it has been necessary to provide one fully equipped and highly organized medical school to aid in setting standards for medical education in China, and to give opportunity for the training of teachers and investigators, it is

realized that the general progress of medicine must depend largely on institutions under other auspices throughout the country; and that in all probability many of the future leaders of the Chinese medical profession will be men who have secured their undergraduate training entirely in such schools. The Board has therefore been greatly interested in the development of medical schools other than that for which it has assumed complete responsibility, and has given some financial aid to those which seemed to offer the most promise of sound growth.

1. Hunan-Yale College of Medicine

In the past, foreign agencies of various kinds have made the greatest contributions to medical progress in China, the Chinese organizations having lacked either the experience or the assurance of continued financial support that are needed for maintaining high-grade medical schools and hospitals. Nevertheless, it is upon the Chinese themselves that the responsibility for progress must eventually rest, and they are already able to make an important contribution of their own, not only in forming and carrying out policies that will be adapted to Chinese conditions, but in securing funds.

In the present period of transition from foreign to Chinese leadership, it is fortunate that there exists, in the Hunan-Yale College of Medicine at Changsha, an institution in which foreigners and Chinese are partners on equal terms. This school is controlled jointly by the Ruchun Educational Association, a society of Hunan gentlemen which receives a subsidy from the provincial government, and by the Yale Foreign Missionary Society. The dean is a Chinese graduate of Yale, who enjoys the full confidence of both foreigners and Chinese, and the staff is made up of Chinese and foreigners in practically equal numbers (six Chinese and seven foreigners). The greatest assets of this school are the interest of the Chinese community in which it is working, and the high educational ideals of its American supporters, resulting from close relations with a great American university. While its resources and staff have been very limited, this disadvantage has to a great extent been compensated by the enthusiasm of its teachers and students, and by the fact that the number of students has been so small that it has been possible to maintain more intimate contact between staff and students than is possible in a larger institution.

The first class of eleven men graduated in 1921, on completion of the five-year course, and in the fall term of that year there were forty-five students registered in the five classes of the medical school. There is probably no hospital in China

where the interns are doing better work than these first graduates are doing in the Hunan-Yale hospital. Instruction in this school, as at Peking, is given entirely in English, on account of the lack of sufficient medical literature in Chinese and the difficulty of securing qualified teachers who speak fluently the Chinese tongue. Much of the success of the school is due to the thorough preparation received by the pre-medical students at the College of Yale-in-China. Women students are now admitted on equal terms with men.

The physical plant consists of a fine 120-bed hospital given by a Yale graduate, a medical school building erected with Chinese funds, and a pre-medical laboratory contributed by the China Medical Board. Funds for an outpatient building to cost about \$25,000 gold have been pledged by the Commonwealth Fund and the provincial government. The budget of the medical school and hospital for the year 1921-1922 amounted to \$87,000 gold. The China Medical Board is making an annual contribution of \$41,605 Mex. and \$6,645 gold to the hospital and pre-medical department, of which about \$7,000 is assigned to the College of Yale-in-China for work in physics, chemistry, and biology. For the 1921-1922 budget, about \$15,000 gold will be available from a grant of the Commonwealth Fund. In normal

years the school receives from the provincial government \$50,000 Mex. (about \$25,000 gold) per annum.

The school has been seriously embarrassed financially during recent years, on account of the political disturbances in Hunan province, which have prevented the government from giving its usual support to educational work. The medical school has suffered with, but no more than, the government educational institutions of Hunan. While all praise must be given to the staff for the results accomplished under great difficulties, more support is urgently needed. The shortage of men has prevented the proper development of departmental organization, particularly for the pre-clinical sciences, which have been taught partly by men with heavy hospital duties. There is also need for more and better qualified assistants in nearly all departments, and for more supplies and equipment. It is to be hoped that generous aid will be forthcoming from the Chinese and foreign friends of the institution, for there are probably few schools in China where greater results may reasonably be expected from the expenditure of any given sum.

2. Shantung Christian University School of Medicine

The work of Christian missionary societies in giving medical aid to China deserves high praise.

Medical education under missionary auspices began in hospitals, where one or two men did all the teaching in addition to carrying the routine clinical and administrative work. While some useful assistants were thus trained it was clear that no permanently satisfactory results could be obtained by this method, and consequently there were organized, in several important centers, medical schools where a few men were set apart for teaching. Even in these schools the teachers were far too few, and very inadequate attention was given to the fundamental sciences. In 1914 there were thirteen such schools under mission auspices.

The Council on Medical Education of the China Medical Missionary Association early drew attention to the desirability of concentrating in a few places the meagre funds available for the maintenance of these schools, in order to insure the best results; and after the China Medical Board undertook to support in Peking a school teaching in English, the Council recommended that medical teaching in Chinese be concentrated so far as possible at the Shantung Christian University at Tsinan. As a result of the growing appreciation of the wisdom of this policy, which was made more evident by the increasing cost of medical work and the difficulty of securing men and money during the late war, as well as by the



Fig. 83.—Ward in Central Hospital, Peking. The hospital, organized and maintained by Chinese, has been aided by the Foundation



Fig. 84.—Nursing demonstration and practice room, Nurses' Home, Peking Union Medical College



Fig. 85.—Corridor connecting units of the hospital group, Peking Union Medical College



Fig. 86.—Surgical ward of hospital building, Peking Union Medical College

more general understanding of the requirements of modern medical science, there has been a marked decrease in the number of schools, six having been closed and no new ones having been opened. It is likely that plans now under discussion will result in still further reduction. At the same time the medical department of the Shantung Christian University, to which, originally, only two societies were contributing, is now officially supported by eight societies, and there are actually nine missionary organizations contributing to its maintenance.

In 1914 the total budget was estimated at only \$20,000 Mex., and there were on the staff only five fully qualified medical teachers and one nurse. There was no administrative staff. In 1916 the China Medical Board made an appropriation of \$50,000 to this school, for new buildings and equipment, and a total of \$100,000 for maintenance for five years, on condition that the school should undertake the instruction of five classes of students previously enrolled at Peking. Additional appropriations were later made to cover the loss by exchange on these grants. This agreement came to an end in 1921, and a new appropriation of \$33,000 Mex. was made for the maintenance of the school during the year 1921-1922, pending discussion regarding the future development of the institution. At the end of

the year 1921 the staff included twenty-one teachers and administrative officers who were either foreigners or Chinese who had studied abroad; there were four foreign nurses; and the locally trained staff had greatly increased in efficiency. The budget contemplated for 1922–1923 amounts to \$143,180 Mex. for the school and hospital. This great increase in the total budget, when the contribution of the China Medical Board has been decreased from the equivalent of \$40,000 to \$33,000 Mex., is convincing evidence of the enterprise of those responsible for the school. A small annual grant is now made by the province.

The preparation of the students has been much improved by the arrival of new teachers of physics, chemistry, and biology, and excellent laboratories for these sciences have been provided in the new buildings of the university. The teaching in the medical school has been entirely reorganized. Men with special training in the pre-clinical sciences have been set free to devote themselves wholly to this fundamental work, and the clinical departments have also been strengthened. More attention has been devoted to the teaching of English, so that now the best students are able to use English books and journals and after graduation can continue their studies in institutions where the teaching is in that language. It is

proposed hereafter to admit women students to the school, and a plan is under consideration for uniting with this institution the medical school for women now at Peking.

Among the important activities of the school are the translation of medical textbooks into Chinese, and co-operation with government institutions and the National Medical Association in working out a Chinese medical terminology. A small journal in Chinese is also being published.

3. Medical Education at Shanghai

The organizations interested in medical education under mission auspices in the lower Yangtze region have been making plans for a union institution in that city, but no definite decision had been reached up to the close of the year. Meanwhile the Pennsylvania Medical School of St. John's University is continuing its work. The China Medical Board has been contributing to this school the salary of one man.

4. Co-operation with Chinese Institutions

The National Medical College at Peking, which is controlled by the Ministry of Education, is one of the most promising schools under purely Chinese control. This institution is contemplating the construction of a new plant. Last year an advantageous site became available, toward

the purchase of which the China Medical Board made a grant of \$6,000. The old site having greatly increased in value on account of business development in its vicinity, the authorities propose to sell it and to apply the proceeds toward the erection of a modern school and hospital.

In general the government schools have suffered during recent years on account of the difficult political and financial conditions in the country, but several of their leading teachers have been sent abroad for further study in preparation for the development which is sure to follow any improvement in the present situation.

There are other important medical schools in China with which the China Medical Board has had no relations other than those of friendly intercourse. Of these the best organized are the South Manchuria Medical College at Mukden, which is supported by the South Manchuria Railway Company, and the former German Medical School at Shanghai, which is now supported largely with Chinese funds. The medical school of the University of Hong Kong, though outside of Chinese jurisdiction, is also making an important contribution to medical education in China. It will have wide influence in the regions to the south, particularly the British East Indies

and the Straits Settlements. The China Medical Board has contributed toward two scholarships in each class of this school for students from the Canton Christian College, the first to become available for the class of 1922.

II. PRE-MEDICAL EDUCATION

As the work of the China Medical Board has progressed, it has become evident that no general improvement in medical education could be expected until well-prepared students were available in much larger numbers than at present. Hitherto the main effort of the Board in the field of pre-medical education has been made in connection with the Peking Union Medical College, where the pre-medical school has served not only to prepare students for study at Peking, but also to set a standard for other institutions. a few teaching fellows were admitted to the school in order that they might have the experience of teaching in a well-equipped school, under the guidance of experienced instructors, while at the same time carrying on studies of their own. hoped that these men will later become useful members of the faculties of other institutions.

At the meeting of the trustees of the College, at Peking in September, 1921, it was decided to look forward to the closing of the pre-medical school as soon as a sufficient number of properly prepared students could be secured from other colleges. As conditions now stand, considerable improvement must be made in the schools and

colleges of China before such action will be feasible. Mention has been made in the reports for previous years of grants in aid of the premedical work at St. John's University at Shanghai; the Hunan-Yale Medical College, Changsha; Ginling College for Women, Nanking; Fukien Christian University, Foochow; and Canton Christian College. Buildings have now been erected with these grants at Shanghai and Changsha, and additional teachers have been secured.

For several years the leading missionary societies have felt that it was necessary to have experts make a careful study of the whole field of Christian education in China with a view to increasing its effectiveness. Last year it became possible to secure an exceptionally well-qualified international commission to make this study. As it seemed to the China Medical Board that the work of the Commission was likely to add much to the effectiveness of its own medical program, a contribution of \$8,000 was made toward the expenses of the undertaking. The investigations of the Commission were carried out in the fall of 1921, but its report has not yet been published. A special investigation of premedical education in Chinese and foreign colleges was also made for the Board in 1921 by Dr. Paul Monroe, of Teachers College, New York,

and by Dr. W. W. Stifler and Dr. S. D. Wilson, of the pre-medical school of the Péking Union Medical College. At about the same time leading Chinese educators, as a result of a preliminary survey made for them by Dr. Monroe, organized a National Educational Reform Association which is proposing to employ Chinese and foreign experts to suggest means of improving the strictly Chinese schools. Great improvements in general education may be expected as a result of these studies, and the medical schools will also profit from them.

III. OTHER ACTIVITIES

A. Aid to Hospitals

In practically all countries it is recognized that even those hospitals which are not connected with medical schools have important educational functions to perform. This is particularly true of the hospitals in China. Besides training interns and nurses they provide opportunities for the continued employment of young doctors who need the facilities of the hospital and the friendly guidance of more experienced men if they are to continue their professional growth. Local medical associations in China have been little developed; there are no medical libraries except in the schools; and outside of a few large cities there is no systematic provision for stimulating professional intercourse between practicing physicians. Association with a good hospital can do much to compensate for these disadvantages, and thus conserve for future usefulness the men turned out by the schools.

The hospital has also a useful part to play in the education of the public. In many cities the mission hospital is the only place where modern medicine is practiced, and the only center for popular health education. In time of epidemic,

famine, or civil war, it is to the hospital that the people and the officials look for medical and surgical aid and for advice as to preventive measures against disease. As a result of the work that these often-isolated institutions have done, there is, on the part of the people, a widespread confidence in Western medicine and a growing appreciation of the importance of public health measures, one indication of which is the popularity of the newly-coined word, wei-sheng ("lifeprotecting," or "sanitary"), which is now frequently seen even on the signs of laundries and barber-shops. In certain cities, the local authorities pay large annual subsidies to mission hospitals in recognition of their public service, and gifts for special purposes are common.

Since the China Medical Board began its work in 1915, grants have been made to mission hospitals to enable them to improve their work, through additions to plant and equipment or through increases of staff and maintenance appropriations. In 1921 payments were made to sixteen such institutions to the total amount of \$123,985.89. It is the usual rule at present to contribute not more than one half of the amount required for the proposed improvements. In this way the interest of other friends of the hospital is stimulated and a broader foundation is laid for future development. New appropriations were

made last year to five institutions: the Methodist Hospital in Peking, for the development of its dental department; the American Board Hospital in Fenchow, Shansi, for the completion of its excellent new hospital and for more adequate maintenance; the Southern Baptist Hospital at Yangchow, Kiangsu, and the Canton Hospital, for maintenance; and the American Presbyterian Hospital at Chefoo, Shantung, for new equipment. The total amount of these appropriations, including sums payable in subsequent years, was \$87,000. Since the funds available for this purpose are limited, effort is made to select for aid progressive institutions in large cities where the prospects for securing local support are best and where the widest influence can be exercised. Grants have thus far been made to only one Chinese hospital, but as time goes on it may be possible to extend the service to additional Chinese institutions, the best of which are already attaining standards not lower than those of the better mission hospitals.

The appropriations to mission hospitals for the salaries of additional foreign doctors and nurses have served to demonstrate that the foreign hospital in China, no less than the Chinese institutions, must depend for their future personnel more and more on the local medical and nurse training schools. Grants made as early as 1915,

for additional foreign doctors and nurses in two hospitals, remained unused in 1921; and under many appropriations made one and two years later, payments had not yet been called for, as the necessary workers had not been found. If effective relief is to be brought to the small hospital, therefore, the medical schools must first be helped to produce more and better qualified Chinese doctors and highly trained Chinese nurses.

There is no doubt that eventually such Chinese workers will prove far more useful than the average foreigner, who is always at a disadvantage when working in a country not his own. The gradual substitution of Chinese personnel, even at salaries equal to the very meagre salaries now paid to foreign missionaries, will bring great economies, for it is often forgotten that the total cost of maintaining a missionary in China is practically double the amount of his salary, on account of the cost of travel to and from the mission field and other special expenses that would not be incurred in the case of Chinese. It seems clear that it will be necessary to pay Chinese doctors larger salaries than in the past, yet even with the more liberal compensation there need be no fear that men will be induced to go into mission medical work from purely mercenary motives. Already, some well-qualified Chinese doctors engaged in private practice have incomes much larger than the salary of any foreign medical missionary.

B. Fellowships and Scholarships

During the year 1921 the sum of \$27,422.82 was expended on fellowships and scholarships for use in Peking and abroad. Twenty-four foreign doctors and five foreign nurses were designated for such aid during the year, and new grants were made to seven Chinese doctors and one Chinese dietitian. One fellowship was granted to an American teacher of physics to prepare him to aid in the development of pre-medical instruction in the Peking district. Special consideration is given to teachers in medical and pre-medical schools, and to nurses in hospitals where training schools are conducted. In the case of doctors in other than teaching hospitals the aid given is usually no more than enough to pay the ordinary tuition expenses in American schools.

Through the assistance of the Director of the Division of Medical Education of the Rockefeller Foundation, temporary teaching appointments at one of the leading medical schools of the United States were secured for two teachers in a medical school in China. These appointments, besides carrying a small compensation, afforded opportunities for a considerable amount of private

study and for intimate acquaintance with the methods of organization and teaching that have proved successful in the United States. The demand for assistants in the science departments of American universities is so much greater than the supply that there should be room for the extension of this service for the benefit of teachers on furlough from China, to whom practical experience of this sort would often prove even more useful than a year spent exclusively in study. The beneficial effects of these various aids to medical workers on furlough have been very marked in the raising of standards of medical schools and hospitals in China.

The results of the fellowships granted to Chinese doctors, nurses, pharmacists, and medical students for study in the United States have been particularly gratifying, in view of the general feeling in China that students sent abroad for study have not on their return justified the hopes that have been placed in them and have failed to find satisfactory employment. If the criticism is just in the case of men in other branches of learning—which is not yet clear—it is certainly not so in the case of most of the students whom the Board has aided. The following table shows the present status of forty-five Chinese who have been aided by the Board since the beginning of its work:

OCCUPATION	DO	DOCTORS		PHARMA- CISTS	TOTAL
	AT WORK	APPTS. ACCEPTED			
Institutional work: Peking Union Medica	1				
College	. 14	4	1	1	20
Hunan-Yale and Red Cross, Changsha	1	1	1	1	Q
Shantung Christian Uni-	-	•	•	•	,
versity		• •	• •	1	2
Chinese Government Se-	-	••	••	• •	•
rum Institute	_	• •	i	• •	2
Mission hospitals	_				2
In private practice Present work not known		1	. ;	• •	1 2
Died		i			1
Studying in U. S. without definite appointments	:	1	1		2
••			_		
Totals		36	6	3	45

Some of the students aided are now among the most promising members of the faculties of medical schools, and practically all are usefully employed in institutions where they will have a chance to develop further under favorable conditions. The Chinese institutions in which five persons are reported are well organized and should provide opportunities for effective work. The three nurses who completed their training are doing good work in well-equipped hospitals in China, and a place is ready for the fourth, who will shortly complete her course. The two nurses whose present occupation is unknown did not receive any considerable aid. They were unable to complete their courses in the United States, one of them because of ill health.

C. Miscellaneous

Grants in aid of the translation and terminology work of the China Medical Missionary Association and the National Medical Association were continued during the year 1921. The preparation of a modern scientific terminology is of fundamental importance for the development of an independent Chinese medical profession. At present Chinese doctors educated under different foreign influences in China and abroad depend, for discussion of scientific matters, either on one of at least four foreign languages, English, French, German, or Japanese, or on different systems of entirely inadequate Chinese nomenclature. This has tended to break up the medical profession into numerous cliques which cannot easily have professional intercourse with one another. Under the auspices of the Ministry of Education a terminology commission has now been established, in which the Ministry and most of the higher educational institutions of the country are represented. This commission meets annually to discuss the work done by its members and to make recommendations to the government for the formal sanction of the terms agreed upon. Considerable progress has already been made with the terms for the fundamental sciences.

The Board has endeavored to assist in various ways the work of the newly organized Council on Hospital Administration of the China Medical Missionary Association. In 1921 the traveling expenses of members of the Council, to attend a meeting at Shanghai, were paid, and arrangements were made for experts in the employ of the Board or the Peking Union Medical College to attend the meeting and advise on architectural problems, purchasing, and X-ray installation. Dr. Houghton, at the request of the Association, prepared forms for mission hospital accounts, and one edition of account books printed according to these forms was published at the expense of the China Medical Board. These books are now in use in several hospitals in China. The X-ray department of the College has given advice regarding purchase of X-ray equipment, and has even assisted in the actual installation and repair of apparatus for mission and other hospitals.

An appropriation of \$5,000 Mex. was made to the North China Union Language School, for repairs and equipment. The Peking Union Medical College depends on this school for the instruction in Chinese of those members of its foreign staff who need for their work at least some knowledge of the language of the people. The school has also been attended by some of the Chinese staff from the southern provinces, who were not familiar with the language as spoken in North China.

An appropriation for emergency sanitary work was made during the famine of 1921, but, the relief organization being able eventually to care for this work themselves, the fund was not used.

While, under normal conditions, the China Medical Board does not itself undertake any public health activities, mention should be made of the very successful work of the Joint Council on Public Health Education maintained by the National Medical Association of China, the China Medical Missionary Association, the Young Men's and Young Women's Christian Associations and the China Christian Educational Association. The Council prepares literature on public and private hygiene and conducts public health campaigns in the leading cities. A laboratory is maintained at Shanghai, where charts and a number of ingenious devices have been prepared to illustrate important points in the lectures. A large collection of slides, and some moving picture films, are kept on hand for use by the staff or to be lent to persons all over the country for lecturing on public health. The extension department of the Shantung Christian University has also been participating actively in this work through a special public health exhibit in its museum and through largely attended popular

lectures. Such popular health education has a distinct bearing on the progress of medical education, since it serves to stimulate interest in study for the medical profession and incidentally gives the people an idea of the aims of the medical schools.

Two years ago the Council on Public Health Education conducted in the city of Foochow a very effective campaign of education against cholera, as a result of which the deaths from the disease were reduced to an insignificant number in that city while other cities in the province continued to suffer severely. This successful effort interested Chinese insurance men in the possibilities of public health work as a business proposition.

In other places outbreaks of plague, cholera, typhus, and other epidemics, in which Chinese and foreign physicians successfully co-operated to protect the communities in which they were working, not only served to draw the attention of the authorities and the people to the necessity for public health organization, but resulted also in increased support for local hospitals. In many cities physicians are being appealed to for aid in the medical inspection of school children and inmates of government institutions. Only the lack of adequately trained personnel appears to prevent the rapid development of such activities.

Toward the end of the year 1921 the first steps were taken for the organization of a purely Chinese national health association under the leadership of Dr. S. M. Woo, a graduate of the Johns Hopkins University Medical School, who took his public health course at Harvard and later served as health officer at Canton. This association has the support not only of the Chinese medical profession but of leading statesmen in all parts of the country, not even excepting the officials of the southern government at Canton. Among its purposes are the promotion of public health education in schools and colleges, the preparation of mobile units to fight epidemics, the demonstration of a modern health organization in a selected locality, the maintenance of a health museum, and research.

The International Health Board of the Rockefeller Foundation has contributed to the public health movement in China by assigning to the Peking Union Medical College a member of its staff, Dr. John B. Grant, as associate professor of hygiene and public health.

Publications of Staff Members, Peking Union Medical College, 1921

- Preliminary survey of the parasites of vertebrates of North China.
 E. C. Faust, China Medical Journal, v. 35, p. 196-210, 3 tab., 3 charts.
- Analyses of some Chinese foods. H. C. Embrey, China Medical Journal, v. 35, p. 247-257, 5 pls., 1 tab.

- Bacteriological examination of smears from 1004 consecutive eye cases. T. C. Pa, National Medical Journal of China, v. 7, p. 52-53, 1 tab.
- The office of Imperial physicians, Peking. E. V. Cowdry, Journal of the American Medical Association, v. 77, p. 307-316, 5 figs.
- Intestinal parasitism in South Fukien. J. P. Maxwell, China Medical Journal, v. 35, p. 377-382.
- Further statistics on communicable diseases among domestic servants.
 J. H. Korns, China Medical Journal, v. 35, p. 382-384, 3 tab.
- 7. The human trichomonas in North China. E. C. Faust, American Journal of Hygiene, v. 1, p. 410-418, 1 pl.
- A comparison of ancient Chinese anatomical charts with the Fünfbilderserie of Sudhoff. E. V. Cowdry, *Anatomical Record*, v. 22, p. 1-13, 6 pls., 24 figs.
- 9. On an unusual anomaly of the Peroneus tertius in a Chinese. P. H. Stevenson, *Anatomical Record*, v. 22, p. 81-83, 1 fig.
- The extrahepatic biliary tract of the camel. P. H. Stevenson, Anatomical Record, v. 22, p. 85-93, 2 figs., 1 tab., 1 pl., 4 figs.
- The excretory system in digenea (trematoda): IV. A study of the structure and development of the excretory system in a cystocercous larva, Cercaria pekinensis nov. spec. E. C. Faust, Parasitology, v. 13, p. 205-212, 6 figs.
- 12. Ray's "hemolytic" test in kala-azar. R. H. P. Sia, China Medical Journal, v. 35, p. 397-399, 1 tab.
- Agglutination titer following repeated intravenous injections of TAB vaccine. C. H. Han and C. W. Young, China Medical Journal, v. 35, p. 400-404, 2 figs.
- The present state of the schistosome problem. E. C. Faust, China Medical Journal, v. 35, p. 405-410.
- The investigation of some Chinese foods. H. C. Embrey, China Medical Journal, v. 35, p. 420-447, 36 charts.
- The use of fine silk in surgery. A. S. Taylor, China Medical Journal, v. 35, p. 467-472, 1 chart.
- Notes on South African larval trematodes. E. C. Faust, Journal of Parasitology, v. 8, p. 11-21, 2 figs., 1 pl., 13 figs.
- A case of Glioma retinae. H. T. Pi, China Medical Journal, v. 35, p. 499-503, 3 pls.
- A collection of Chinese embryos. P. H. Stevenson, China Medical Journal, v. 35, p. 503-520, 3 figs., 5 tab.
- Mastoiditis in Peking. A. M. Dunlap, China Medical Journal, v. 35, p. 521-527.
- Serum globulin in kala-azar. R. H. P. Sia and H. Wu, China Medical Journal, v. 35, p. 527-532, 6 tab.
- Preliminary survey of the intestinal parasites of man in the Central Yangtze valley. E. C. Faust and C. M. Wassell, *China Medical Journal*, v. 35, p. 532-561, 1 chart, 5 tab.
- Toxicity of antimony in rabbits. J. H. Korns, China Medical Journal, v. 35, p. 564-566, 1 tab.

- Filariasis in China. J. P. Maxwell, Philippine Journal of Science, v. 19, p. 257-327, 7 tab., 4 figs., 25 pls.
- The menace of insanity to popular government. A. H. Woods, National Medical Journal of China, v. 7, p. 201-204.
- Result of refraction in the Peking Union Medical College. T. T.
 Dzen, National Medical Journal of China, v. 7, p. 206-308, 4 tab.
- A study of trichomonas of the guinea-pig from Peking. E. C. Faust, Archiv für Protistenkunde, v. 44, p. 115-118, 1 fig., 1 tab., 1 pl.
- Incidence of vaccination and smallpox in North China. J. H. Korns, China Medical Journal, v. 35, p. 561-563.
- Studies on the retina: Histogenesis of the visual cells in amblystoma.
 R. Detwiler and H. Laurens, Journal of Comparative Neurology,
 v. 33, p. 493-508, 13 figs.

DIVISION OF MEDICAL EDUCATION

Report of the General Director

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To the President of the Rockefeller Foundation: Sir:

I have the honor to submit herewith my report as General Director of the Division of Medical Education for the period January 1, 1921, to December 31, 1921.

Respectfully yours,
RICHARD M. PEARCE,
General Director.

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DIVISION OF MEDICAL EDUCATION

During 1921 the Division of Medical Education, in pursuance of the objects for which it was established in December, 1919, included in its program the following main activities: (1) surveys of medical education in the Far East; (2) resident counsel in the development of the Peking Union Medical College at Peking, China, and studies of conditions in medicine and pre-medical science throughout China; (3) co-operation in programs of medical education in the Americas and Europe; and (4) arrangements for observation and study by commissions and fellows.

I. Surveys in the Far East

The Director of the Division spent the year 1921 in the Far East. Here he made surveys of the conditions and requirements of medical education in various localities, including Japan, Hong Kong, Siam, the Philippines, the Straits Settlements, and Indo-China, as well as in China proper. Following is a brief summary of conditions as observed in these countries and districts.

Japan

In Japan and regions under Japanese influence medical education is making rapid progress.

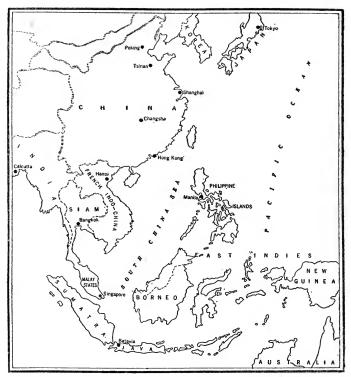


Fig. 87.—Important schools of medicine in the Far East

The organization of the medical schools is similar to that of German schools. The best of these institutions are on a level with those of other progressive countries. The Japanese seem abundantly able to carry out needed developments in the fields of medical education and research.

Hong Kong

In countries surrounding the South China Sea it is notable that medical schools have been established and maintained at chief points on regular trade routes. Hong Kong, Manila, and Singapore are such ports of call for ocean traffic in this region, maintaining contact with a wide surrounding territory. The University of Hong Kong, for example, has in the last seven years enrolled 114 medical students, drawn from different areas as follows: fifty from the Straits Settlements, thirty-seven from Hong Kong itself, nineteen from various parts of China proper, two each from India, the Philippines, and Siam, and one each from Australia and Sumatra. Kong is one of the two commercial centers of southern China. The nearest medical schools to the south, are at Manila, Bangkok, and Singapore, and to the north, at Shanghai. Being a British colony, it has the advantage of offering the Chinese student association with European institutions and point of view while allowing him to keep in touch with the best of Chinese life and traditions. The Faculty and Senate of the University of Hong Kong have developed good laboratories and are interested in medical teaching on an academic basis. From lack of funds they have been unable to put into effect their complete plans for teaching organization.

Siam

Recently interest in public health and medical education has developed in Siam, and an admir-



Fig. 88.—Medical schools in Japan

able plan has been made for public health organization. The chief difficulty is lack of personnel to administer the actual work. Siam illustrates the final dependence of public health programs on adequate medical education. It is estimated that 95 per cent of the inhabitants have no other medical attention than that of the native-trained Siamese or Chinese doctors. or that of priests, "spirit doctors," and so forth. Possibly not more than 1 per cent, and these only in Bangkok or in mission centers, can have the attention of physicians trained in modern medicine. In this connection it should be borne in mind that Siam is an agricultural country, with small, widely scattered communities and only two cities of more than 10,000 inhabitants. Few of these communities could under any circumstances maintain a modern medical practitioner. The desire for modern medical treatment is still to be inculcated in the mass of the Siamese by the government medical and public health services. These government services themselves, however, to carry out their programs need both well-trained, fully qualified doctors and also men of shorter training to serve as sanitary inspectors, hospital assistants, and so forth. At present not enough men are being trained to meet the demands of government services alone. This condition is due to several

causes: the period of training for medicine is longer than for any other profession in Siam, while the financial returns are not greater. In fact, the income of physicians is not so large as that of lawyers, for whom the course of study is three years shorter. The problem is further complicated by the small number of graduates of secondary schools—at present forty to seventy men a year—from which to recruit all the professions.

The Royal Medical College of Bangkok is a department of the Chulalonghorn University and is under direct control of the Minister of Education, who is responsible only to the King. The buildings of the medical school are inadequate for the purposes for which they are now used. It is believed, however, that they represent a nucleus of laboratories and hospital buildings around which a creditable medical school could be developed.

Straits Settlements

The King Edward VII Medical School at Singapore, although it has received considerable endowment from local merchants, is an integral part of the Colonial Government and essentially a sub-department of the Medical Service of the Straits Settlements and the Federated Malay States. It was not established primarily for the



Fig. 89.—Building for pathology and tropical medicine, Faculty of Medicine, Hong Kong University



Fig. 90.—College of Medicine and Surgery, University of the Philippines, Manila



Fig. 91.—Wing of General Hospital, Manila, Philippine Islands



Fig. 92.—New medical building, University of Alberta, Edmonton, Province of Alberta, Canada

training of private practitioners, but for supplying the needs of the Medical Service. Scholarships are provided for about 90 per cent of its students and preference is now given to applicants from local sources, although formerly about half the students came from India and Ceylon-none It is understood that the standard from Siam. of student qualifications has been raised to that of an English university medical school. As the school is not a department of a university, however, it cannot grant degrees, although it gives the diploma of Licentiate in Medicine and Surgery. Plans have been approved for medical teaching on a university basis, but recent financial depression has made it necessary to postpone putting these into effect. The school is of the greatest importance in the field for which it was established—that of satisfying the Government's needs in medical and public health personnel.

Indo-China

In Indo-China the Government maintains a medical school at Hanoi. This school in the past has been concerned chiefly with the training of men for the Colonial Government services, such men entering the medical school without extensive preliminary training. During the past year, in view of the development of the University at Hanoi, a more thorough system of teach-

ing has been developed, and at the end of four years in Hanoi students will be sent to France for a year of postgraduate instruction. Thus far, only a small number of students have entered the higher course, and the older school with lower standards continues.

Philippine Islands

In the Philippines, Governor General Leonard Wood, himself a physician, is eager to develop in every way the medical and public health resources of the Islands. He has invited the co-operation of the Rockefeller Foundation and of its International Health Board. The invitation has been accepted on the part of the International Health Board, and the Division of Medical Education hopes to be able to participate by lending temporarily the services of an associate dean for the College of Medicine and Surgery of the University of the Philippines.¹ The pre-medical departments of the University—physics, chemistry, and biology —are spaciously housed, well-equipped, wellmanned, and doing good work. The Medical School itself has excellent laboratories, it is in close affiliation with the Manila General Hospital,

¹In March, 1922, Dr. William S. Carter, Dean of the University of Texas Medical School, on leave of absence, sailed for Manila to accept this post.

and the prospects for development under Filipino management are good. It is thought, however, that this development can be hastened by continued co-operation for the present on the part of those interested in Western medicine.

II. Peking Union Medical College and Studies in China

For the greater part of the year, the Director of the Division of Medical Education served in China, making for the China Medical Board of the Rockefeller Foundation a general survey of medical and pre-medical education in China, and acting in an advisory capacity to the Peking Union Medical College. The College which has been erected and is being maintained by funds from the Rockefeller Foundation, was going through a formative period with the completion of its new buildings and the installation of its various departments in their permanent quarters. Problems of organization had consequently to be solved. The Director of the Division served also as Acting Director of the College for several months during the absence of Director Henry S. Houghton. A further account of the work in China during 1921 will be found in the annual report of the China Medical Board.

III. The Americas and Europe The United States

In the United States the Foundation cooperated with the General Education Board in support of plans for reorganizing and rebuilding the medical schools of Columbia University and the University of Chicago.

Canada

In the various Canadian medical schools to which the Foundation in 1920 pledged assistance progress was made during 1921.

At Dalhousie University, Halifax, the facilities of the compactly arranged group of buildings representing the medical school and hospital have recently been enlarged by the erection, under the Salvation Army, of a maternity hospital, soon to be opened. Toward the cost of this hospital an additional appropriation of \$50,000 was made by the Foundation to the University.

The \$6,000,000 endowment fund for which McGill University, Montreal, conducted a campaign, was oversubscribed. The Foundation's 1920 pledge of \$1,000,000 to this fund was paid in full during 1921. The University has practically completed its new biological building and has made arrangements preparatory to the building of a new institute of pathology.

The University of Toronto, with aid from the Provincial Government, has proceeded with its building of an institute of anatomy, which by the end of the year was well under way. Plans for the erection of a psychiatric hospital by the city of Toronto on a site granted by the University are in course of preparation.

The University of Manitoba, at Winnipeg, received from the Manitoba Legislature during 1921 appropriations sufficient to meet the conditions of the Foundation's pledge of 1920. Payments on this pledge were accordingly begun. One of the new Medical College buildings was put into use in the course of the year; and at the end of the year the second building was about to be opened.

Appropriation of \$25,000 was continued for a second year to the University of Alberta, at Edmonton. An appropriation of a similar sum was also made for a second year to the University of Montreal, teaching in French, which has through this appropriation made progress in developing the sciences preliminary to medicine—developments which it is hoped will have a far-reaching influence in the training of the French medical profession of Canada.

Brazil

Following various surveys of medical and public health conditions in Brazil, and co-opera-

tion by the Foundation's International Health Board in establishing a department of hygiene in the Faculdade de Medicina e Cirurgia at São Paulo, the Foundation was requested by the Faculdade to select an American professor to build up a modern department of pathology in this school. During 1921 Dr. Oskar Klotz, then professor of pathology and bacteriology in the University of Pittsburgh, was chosen for this post for a period of two years, and entered upon his duties. Provision has been made by the Foundation for supplying Dr. Klotz with necessary assistants and scientific equipment for this work.

France

The attention of the Rockefeller Foundation was called to the fact that the Pasteur Institute in Paris, which maintains several branches, including those in Lille, Algiers, West Africa, and Indo-China, was suffering materially in the post-war period, not only from the high cost of necessary supplies, but also from the high cost of living which forced several of its scientists to seek positions elsewhere in order to maintain themselves. To meet this temporary situation the Foundation gave to the Institute \$30,000 for its work in 1921, and pledged \$25,000 and \$20,000 respectively for 1922 and 1923, with no further commitment for the future. It is expected that



Fig. 93.—The new medical center in Brussels. The group of buildings shown in the architect's sketch, combining a medical school and laboratories, a hospital, and a nurses' home and training school, are being constructed by the University of Brussels and the Hospital Board of the municipality with the aid of the Rockefeller Foundation

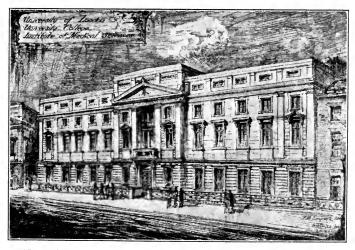
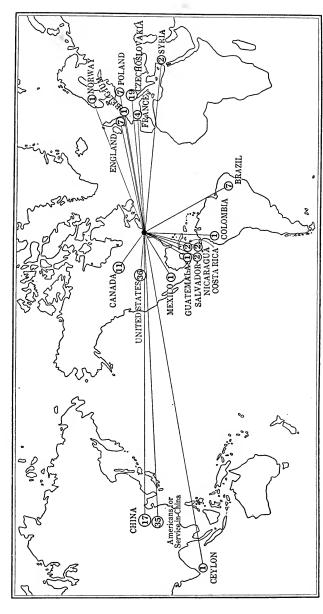


Fig. 94.—Institute of Anatomy, University College, University of London. Architect's drawing of one of the new Institutes being erected with Foundation aid



directly by the Foundation are designed to fit men and women for leadership and technical efficiency Fig. 95.—Fellows from eighteen countries. Fellowships for which funds were directly or indirectly supplied by the Rockefeller Foundation were held by 157 individuals in 1921. Fellowships granted in preventive medicine and medical education

these funds will be used largely for the training of new personnel, through the granting of fellowships and the supplying of equipment requisite for such training.

Belgium

Progress was made toward rebuilding and reorganizing the medical school of the Free University of Brussels, to concentrate its facilities and co-ordinate the efforts of many agencies. Conferences were held in Brussels by the President of the Foundation and a representative of the General Education Board; a pledge of \$250,000—in addition to the earlier pledge of 40,000,000 francs to this medical school-was made by the Foundation for endowment of the teaching hospital of the school; additional land was ceded to the medical school by the city of Brussels; and the architect has studied hospital and laboratory construction in England, Canada, and the United States, as the guest of the Foundation and has almost completed the first draft of plans for the new buildings.

England

With University College and University College Hospital in London the final contracts in regard to their medical school, by which the Rockefeller Foundation agreed to give 1,205,000 pounds for buildings, equipment, and endowment were

executed. The new Anatomy Building made rapid progress, and desired property has been secured for the hospital building. Decline in building costs has worked to the advantage of the medical school. A large number of entering students has been reported. Development of the full-time, or *unit*, system of teaching here is being watched with interest throughout Great Britain.

Central Europe

To enable the universities of Continental Europe to keep in touch with the developments of medical science in England and America, temporary aid in the supplying of important English-language medical journals was continued in 1921 for a second year to the medical schools of countries suffering from adverse exchange. The journals were paid for by the recipients at prewar rates of exchange. By this means schools were enabled to maintain their files of important journals at a time when financial conditions would otherwise have made it impossible for them to continue their subscriptions. A few of the more important medical centers were helped also to obtain necessary scientific equipment which had been depleted during the war.

Medical journals were supplied during 1921 to medical school libraries in the following cities: Gratz, Innsbruck, and Vienna, in Austria;

Brussels and Ghent, in Belgium; Bratislava, Brno, and Prague, in Czechoslovakia; Lyons and Paris, in France; Berlin, Breslau, Frankfort, Freiburg, Göttingen, Greifswald, Hamburg, Hanover, Heidelberg, Jena, Kiel, Cologne, Leipsig, Marburg, Munich, Rostock, Tübingen, Wiesbaden, and Würzburg, in Germany; Budapest in Hungary; Bologna, Genoa, Naples, Rome, and Turin, in Italy; Belgrade and Zagreb in Jugoslavia; and Cracow, Lwow, and Warsaw, in Poland; and also to Russian scientists, to whom they were distributed through an agency in London.

IV. Commissions and Fellowships Commissions

To promote international exchange of medical experience and thus to increase the common fund of knowledge to which all nations contribute and upon which each may freely draw, the Foundation has sought to encourage visits and conferences between medical educators of different countries and the postgraduate study of medicine by visiting fellows who will return to definite posts in their own countries. In following out the first part of this program, the President of the Foundation during the year visited the medical centers in London and Brussels, first with a representative of the General Education

Board, and again with the General Director of the Foundation's International Health Board.

From several countries commissions made up of individuals concerned in one way or another with problems of medical education paid visits, as guests of the Foundation or its departmental boards, to medical centers of England, Canada, and the United States.

A commission of two-Mr. Armand Goossens-Bara and Mr. J. B. Dewin—came from Belgium to the United States in July and later went to England to study the construction and administration of hospitals and medical schools, in the interest of the new medical center being built in Brussels by the aid of the Foundation. Mr. Goossens-Bara is president of the Conseil des Hospices, the board which administers the public hospitals of the city of Brussels, including the teaching hospital of the medical school of the Free University of Brussels. Mr. J. B. Dewin is the architect appointed by the University to plan the buildings of the new medical center. Certain problems in the teaching of medicine were studied in London by three members of the faculty of the University of Brussels-Dr. A. Brachet, professor of anatomy, Dr. Paul Vandervelde, professor of pathological anatomy, and Dr. René Verhoogen, professor of pathology.

During the months of May and June, Sir

Wilmot Herringham, chairman of the Committee on Medical Education of the University Grants Committee and Sir Walter Fletcher, secretary of the Medical Research Council (English Privy Council) visited representative institutions of medical education and research in Canada and the United States. Also, in connection with the plans of the University College Hospital Medical School, Dr. A. E. Boycott, professor of pathology, and Dr. C. C. Choyce, professor of surgery, paid a visit to the United States and Canada to study methods of medical education and research.

In September three Serbian physicians arrived in New York to study medical education, hospital organization, and public health administration in representative institutions of the United States and Canada. On this commission were Dr. Georges J. Nikolitch, under-secretary and first medical officer of the Ministry of Health of the kingdom of the Serbs, Croats, and Slovenes, Dr. Georges Joannovitch, professor of pathological anatomy, and Dr. Radenko Stankovic, professor of internal medicine, in the University of Belgrade. On leaving the United States they proceeded to England on the same mission.

Dr. Carlos Chagas, director of the Oswaldo Cruz Institute at Rio de Janeiro, and Director General of the National Department of Health of Brazil, spent the months of May and June in the United States visiting medical and public health institutions.

Fellowships

One of the Foundation's most profitable fields of work has been the training, under fellowships, of men from other countries who intend to return home to occupy positions of responsibility as teachers, investigators, or public health officials. In addition to promoting international co-operation, continued experience has shown that the training of scientists and educators for work in their own countries is the best way in the long run to build a firm foundation for medical teaching and research. From small beginnings, the selection and assistance of fellows has developed into an appreciable part of the work of the Foundation—so much so that it has been found necessary to place in charge of one man, Dr. Clifford W. Wells, the immediate responsibility for the fellowships of the Foundation and its boards. Aside from the fellowships in physics and chemistry supported by the Rockefeller Foundation and administered by the National Research Council, a total of 123 Foundation fellowships were in force in the course of the year 1921. Of these, fellowships under the Division of Medical Education were held by

men representing the following institutions, with most of which the Foundation has otherwise co-operated: in Belgium, the Free University of Brussels; in Brazil, the Faculdade de Medicina e Cirurgia in São Paulo and Oswaldo Cruz Institute in Rio de Janeiro; in Canada, the University of Alberta at Edmonton, Dalhousie University at Halifax, the University of Manitoba at Winnipeg, and the University of Montreal; in England, University College, London; and in Syria the American University of Beirut.

During the past two years, from different sides, the attention of both the Rockefeller Foundation and the General Education Board has been called to the shortage of medical teachers in the United States. The problem was discussed by officers and members of the General Education Board, and by them submitted to a larger group interested in medical education, including officers of both organizations. A report of the conclusions of this group resulted in the passage by the Foundation and the General Education Board of concurrent resolutions which look toward co-operation between these organizations and the National Research Council in establishing a system of fellowships which should tend to satisfy the present needs of medical schools for teachers who are both competent instructors and original investigators.

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THE ROCKEFELLER FOUNDATION

Report of the Treasurer

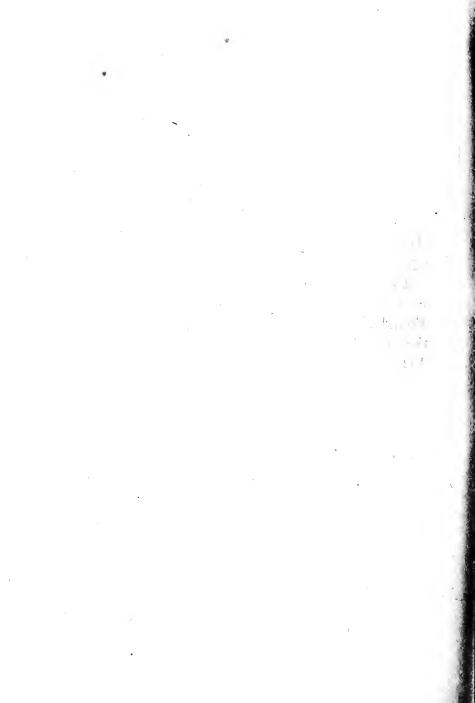
New York, February 9, 1922

To the President of the Rockefeller Foundation: Sir:

I have the honor to submit herewith my report of the financial operations of the Rockefeller Foundation and its subsidiary organizations for the period January 1, 1921, to December 31, 1921.

Respectfully yours,

L. G. MYERS, Treasurer.



TREASURER'S REPORT

During the year 1921 income from general principal fund and from income temporarily invested amounted to \$8,702,689.70. Undisbursed income carried over from 1920, after adding sundry refunds, amounted to \$6,286,669.69. A total of \$14,989,359.39 was therefore available for disbursement. Disbursements during the year amounted to \$7,630,358.49, leaving a balance of \$7,359,000.90.

On December 31, 1921, the total of all unpaid appropriations and pledges amounted to \$23,219,394.11, as follows:

Balance due on appropriations payable in 1921 and prior years Appropriations and pledges which become effective in 1922 and fol-	\$4,032,997.71	
lowing years:		
1922 \$6,280,746.40		
1923 4,619,892.00		
1924		
1925		
1926 2,229,500.00		
	19,186,396.40	
-		\$23,219,394.11

The undisbursed balance of income amounting to \$7,359,000.90, reported above, is thus exceeded by the total of all unpaid appropriations and pledges to the extent of \$15,860,393.21. This undisbursed balance does, however, exceed unpaid appropriations due in 1921 and prior years (\$4,032,997.71) by the sum of \$3,326,003.19. Appropriations and pledges effective in 1922, amounting to \$6,280,746.40, will be more than covered by 1922 income estimated at \$8,000,000.00; while appropriations and pledges effective in 1923 and subsequent years will be met with income to be received in those years.

General principal funds, including the reserve fund, increased during the year from \$174,315,913.06 to \$174,395,157.50, a difference of \$79,244.44. This is accounted for by gains on sales of securities amounting to \$63,169.24, and by gains on sales of land in China, amounting to \$16,075.20.

Income expended for land, buildings, and equipment, almost wholly in China, amounted to \$1,156,227.71, which, added to the balance carried over from 1920, made a gross total of \$8,709,063.12. Depreciation of equipment, sales of land and material, and a small gift of books, amounting in all to \$42,250.25, reduced this sum to a net total of \$8,666,812.87.

Since the close of the year the accounts of the Comptroller, the accounts of the Treasurer, and the securities owned by the Corporation have been examined by Messrs. Lybrand, Ross Bros. & Montgomery, Accountants and Auditors. A report of their work rendered to the Chairman of the Board of Trustees will be found on page 408.

The financial condition and operations are set forth in the appended exhibits listed below:

Balance Sheet	Exhibit A
Statements of Receipts and Disbursements of Income	Exhibit B
Foundation Appropriations:	
Medical Education	Exhibit C
School of Hygiene and Public Health.	Exhibit D
Research in Physics and Chemistry	Exhibit E
Mental Hygiene	Exhibit F

Hospital, Dispensary, and Nursing	
Studies and Demonstrations	Exhibit G
War Work	Exhibit H
Miscellaneous	Exhibit I
International Health Board Appropria-	
tions	Exhibit J
China Medical Board Appropriations	Exhibit K
Summary of Appropriations and Pay-	
ments	Exhibit L
Statement of Appropriations and Pay-	
ments of Special Funds	Exhibit M
Statements of Principal Funds	Exhibit N
Land, Buildings, and Equipment Funds.	Exhibit O
Statement of Transactions Relating to	
Invested Funds	Exhibit P
Schedule of Securities in General Funds.	Exhibit Q
Schedule of Securities in Special Funds.	Exhibit R

EXHIBIT A

BALANCE SHEET, DECEMBER 31, 1921

ASSETS

I. Investments General Fund General Schedule (Exhibit Q) Less amount of income invested (see below) Special Funds (Exhibit R)	3,299,674.43	\$174,395,157.50 116,800.00
		\$174,511,957.50
II. LAND, BUILDINGS, AND EQUIPMENT In China	\$8,631,832.92 34,979.95	\$8,666,812.87
III. INCOME ACCOUNTS Special Funds Cash on deposit in New York. General Fund Cash on deposit in New York. Cash in London: £24,826-6-6 at \$3.7523. Cash in Brussels: Francs 20,840,577.05 at 7.3638¢. Moneys loaned. Income invested temporarily (Exhibit Q).	93,156.44 ; 1,534,685.92 800,000.00	
Funds in hands of agents, to be accounted for, and sundry accounts receivable	1,566,884.29 \$7,359,000.90	22 210 204 11
		23,219,394.11 \$23,224,256.31
Grand Total		\$206,403,026.68

EXHIBIT A

BALANCE SHEET, DECEMBER 31, 1921

FUNDS AND OBLIGATIONS

FUNDS AND UBLIGA	TIONS	
I. Funds General Fund (Exhibit N) Reserve Fund (Exhibit N)	\$171,204,624.50 3,190,533.00	\$174,395,157.50
Special Funds Gift of John D. Rockefeller Gift of Laura S. Rockefeller Henry Sturgis Grew Memorial Fund Arthur Theodore Lyman Endowment	\$37,000.00 49,300.00 25,000.00 5,500.00	
II. LAND, BUILDINGS, AND EQUIPMENT FUND Appropriations from income (Exhibit O)		\$174,511,957.50 \$8,666,812.87
III. INCOME ACCOUNTS		
Special Estate Laura S. Rockefeller Fund (Exhibit B) Henry Sturgis Grew Memorial Fund Income (Exhibit B) Arthur Theodore Lyman Endowment Fund Income (Exhibit B)	\$64.77 4,082.95 714.48	\$4 ,8 62 .20
General Fund Balance due on appropriations payable in 1921 and prior years (Exhibit L)	\$ 4,032,997.71	
1925	19,186,396.40	*23,219,394.11
		\$23,224,256.31
GRAND TOTAL		\$206,403,026.68

^{*} The total of all unpaid appropriations and pledges is \$15,860,393.21 in excess of the balance of general fund income amounting to \$7,359,000.90, as shown on opposite page, but it will be noted that these obligations become effective over a term of years, thus permitting their satisfaction gradually as the income of the respective years is received.

EXHIBIT B

STATEMENT OF RECEIPTS AND DISBURSEMENTS OF INCOME GENERAL FUND

RECEIPTS		00 010 100 00	+
Balance, December 31, 1920 Refunds of payments made in prior years The Rockefeller Foundation China Medical Board International Health Board	\$27,115.03 52,704.12 2,534.15	\$0,2U 1 ,310.39	
		82,353.30	\$6,286,669.69
Income from principal funds and from income invested temporarily			8,702,689.70
Disbursements			\$14,989,359.39
INTERNATIONAL HEALTH BOARD (Exhibit J) Hookworm, county health work, malaria and yellow fever. Tuberculosis in France Public Health education and fellowships: Miscellaneous. Administration.	\$921,799.42 438,951.25 82,696.53 62,814.38 122,990.56	000 000 14	
CHINA MEDICAL BOARD (Exhibit K) Medical education		#1,023,202.1 1	
Teking Union Medical Conege Land and buildings Operation	\$1,114,973.36 393,349.37		
Strangtan Medical School Land and buildings Unaffiliated medical schools Pre-medical education Hospitals—Mission and Chinese	41,059.02 27,290.76 78,013.25 143,601.38		

	•			7,630,358.49	\$7,359,000.90			
	1,955,450.46 $2,156,216.68$	281,874.87 41,500.00 60,573.88	2,682.16 2,682.16 1 161 401 68	170,123.34	' '1	\$64,599.82 93,156.44 1,534,685.92 800,000.00 3,299,674.43	1,566,884.29	\$7,359,000.90
Translation of medical and nursing textbooks 6,368.69 Fellowships and scholarships 7,422.82 Miscellaneous 9,773.39 Administration 113,598.42	Medical Education (Exhibit C). Schools of Hygiene and Piritic Health (Exhibit D):	Johns Hopkins University. Harvard University RESEARCH IN PHYSICS AND CHEMISTRY (Exhibit E) MENTAL HYGENER (Exhibit F)	Hospital, Dispense (Exhibit G) War Work (Exhibit H) Miscellaneous (Exhibit I)	Administration (Exhibit I).	Income on hand December 31, 1921	Income on hand December 31, 1921, is accounted for as follows: Cash in New York. Cash in London. Cash in Brussels. Moneys loaned. Income invested (Exhibit Q). Funds in hands of agents, to be accounted for, and sundry accounts receivable. \$1,573,108.08	,	

EXHIBIT B—Continued SPECIAL FUNDS

\$714 48	Accounted for in cash on deposit.
\$465.86 248.62	Balance December 31, 1920 Income collected during the year ending December 31, 1921
\$4,082.95	Accounted for in cash on deposit
\$2,984.33 1,098.62	Balance December 31, 1920 Income collected during the year ending December 31, 1921
\$64.77	Balance accounted for in cash on deposit
\$28,753.63 28,688.86	Balance of income December 31, 1920 Balance of appropriation of \$212,688.86 paid to Fifth Avenue Baptist Church
\$1,850.00 1,850.00	Income collected during the year ending December 31, 1921 Amounts paid to the several societies designated by Mr. Rockefeller
\$3,000.00 3,000.00	Income collected during the year ending December 31, 1921 Amounts paid to the several societies designated by Mrs. Rockefeller

EXHIBIT C

1921 FOUNDATION APPROPRIATIONS,

Unpaid Balances of Appropriations Made in Previous Years, and Payments Thereon Made in 1921 MEDICAL EDUCATION

	TREAS	URER'S	S REP	ORT			351
1921 PAYMENTS	\$28,517.44	3,796.80	2.131.13		•	8,128.19	of the Board or
1921 APPROPRIA- TIONS	\$50,000.00	5,000.00		•	4 000 00	15,600.00	ers of the resolution
PRIOR APPROPRIA- TIONS	\$99,893.40	742.29	3,000.00	1,000.00	4,000.00		are the serial numbe
Austria Humeny Doland Grashoslovalia and Iuro Claria	The co-operate with the Medical Schools of the Universities of Vienna, Prague, Innsbruck, Budapest, and Gratz, in the rehabilitation of their scientific equipment for teaching and research (R.F. 2495, 2581)*	Belgium Expenses of visit to England and the United States of representatives of the University of Brussels (R.F. 2577, 2498)	Brazil Oswaldo Cruz Institute, Rio de Janeiro. For extending its work in pathology (R.F. 2485)	Oswaldo Cruz Institute. For traveling expenses of successor to Dr. B. C. Crowell (R.F. 2487). São Paulo University Salary of Professor of Pathology—84 000 per year	for three years beginning 1920–21 (R.F. 2486). (Instalment due 1920–21). (Instalment due 1921–22).	Faculdade de Medicina e Cirurgia, São Paulo. To cover traveling expenses of Professor of Pathology and family to Brazil, and supplement salary during the years 1921 and 1922 (R.F. 2551, 2552, 2554, 2589).	*The figures in parentheses, following the text describing the purpose of each appropriation, are the serial numbers of the resolution of the Board or Executive Committee, authorizing the payment.

EXHIBIT C-Continued

MBDICAL EDUCATION—Continued	PRIOR APPROPRIA- TIONS	1921 APPROPRIA- TIONS	1921 PAYMENTS
Brazil—Continued Faculdade de Medicina e Cirurgia, São Paulo. Scientific equipment and assistants for Department of Pathology (R.F. 2569)	•	\$5,000.00	\$1,909.21
mada University of Alberta. For the development of work in clinical branches (R.F. 2489, 2582)	18,750.00	25,000.00	31,250.00
Dalhousie University. For the improvement of clinical facilities (K.F. 2571).	:	50,000.00	:
University of Manitoba. For interest on pledge of \$500,000 for general endowment (R.F. 2570)	:	25,000.00	25,000.00
Onversity. For interest on piedge of \$1,000,000 for general ment (R.F. 2549, 2625).	:	52,602.74	52,602.74
(R.F. 2601)		1,000,000.00	1,000,000.00
Université de Montreal, Faculty of Medicine. For the development of laboratories (R.F. 2488, 2580)	12,500.00	25,000.00	25,000.00
niversity of Toronto. For interest on pleage of \$4,000,000 for general endowment (R.F. 2567)	:	50,000.00	25,000.00
gland Expenses of visit to the United States of medical educators (R.F. 2482, 2490, 2562)	6,725.35	3,000.00	6,184.86
University of London. For interest on pledge of £180,000 for general endowment of University College (R.F. 2556)	:	36,000.00	33,646.87

	TREAS	SURE	R'S REPO	ORT			353
81,374.29	30,000.00	5,017.93	43,739.53	10,000.00	17,573.89	14,068.57	\$2,156,216.68
775,000.00 87,000.00 212,500.00	30,000.00	8,000.00	50,000.00	35,000.00	38,850.00	22,000.00	\$187,220.61 \$2,604,552.74 \$2,156,216.68
	•	•	18,988.82	:	9,868.42	11,752.33	\$187,220.61
University of London. Toward building and equipment program of University College, £200,000 (R.F. 2541). University of London. For interest on pledge of £435,000 for general endowment of the University College Hospital Medical School (R.F. 2557). University of London. Toward building and equipment program of the University College Hospital Medical School, £50,000 (R.F. 2504)	France Pasteur Institute. Towards its work during 1921 (R.F. 2559)	Expenses of visit to the United States of representatives of the Belgrade Medical School (R.F. 2576)	United States University of Chicago Interest on pledge of \$1,000,000 for the development of a medical school (R.F. 2430, 2515)	New York University To provide facilities for teaching preventive medicine, hygiene, and sanitation (R.F. 2572)	Fellowships Grants to doctors for medical study (R.F. 2499–2502, 2467, 2477, 2491, 2543, 2544, 2553, 2563)	Division of Medical Education Administration (R.F. 2469, 2516)	Totals

PAYMENTS

1921

\$2,156,216.68

\$2,500,583.71

\$144,218.74

Net Totals.....

1921 APPROPRIA TIONS	÷ ÷ •	103 969 0
PRIOR APPROPRIA- TIONS	\$43,001.87	
EXHIBIT C—Continued MEDICAL EDUCATION—Continued	Unexpended balances of appropriations allowed to lapse— Oswaldo Cruz Institute (R.F. 2487) São Paulo University (1920) (R.F. 2486) Travel—University of Brussels (R.F. 2498) Travel—Bellowships (R.F. 2490) Fellowships (R.F. 2500–2502, 2467, 2477, 2491) Fellowships (R.F. 2500–2502, 2467, 2497) University of Chicago (R.F. 2430) São Paulo University (1921) (R.F. 2486) São Paulo University (1921) (R.F. 2486) Cuniversity of London (R.F. 2556) University of London (R.F. 2556) University of London (R.F. 2551) Fellowships (R.F. 2499), 2552, 2563, 2544) Fellowships (R.F. 2499), 2552, 2563, 2544)	Division of Medical Education (R.F. 2516)

EXHIBIT D

SCHOOLS OF HYGIENE AND PUBLIC HEALTH

						•
1921 Payments	\$29,000.00 12,500.00	4,671.10 240,020.76 22,387.03 8,453.06 5,129.37 1,213.55	\$323,374.87		• • • • • • • • • • • • • • • • • • • •	\$323,374.87
1921 APPROPRIA- TIONS	\$29,000.00 500,000.00 12,500.00	250,000.00	\$791,500.00		8,252.26	\$783,247.74
PRIOR APPROPRIA- TIONS	• • • • • • • • • • • • • • • • • • • •	167,025.92 90,900.78 28,756.88 10,440.11 5,147.39 1,313.15	\$303,584.23		21,441.10	\$282,143.13
	Harvard University—School of Public Health For interest on pledge of \$1,160,000 for endowment (R.F. 2585) For buildings and equipment (R.F. 2578) Toward cost of operation during the year 1921 (R.F. 2586)	Johns Hopkins University—School of Hygiene and Public Health For the establishment of a School of Hygiene and Public Health (R.F. 2170). Operating Expenses (R.F. 2417, 2462, 2506) Building Alterations (R.F. 2358, 2408, 2447). Furniture (R.F. 2409, 2448). Equipment (R.F. 2410) Replacing records destroyed by fire (R.F. 2449).	TOTALS	balances of appropriations allowed to lapse— Johns Hopkins University """" """" """" """" """" """	R.F. 2449 " " 99.60 R.F. 2452 " " " 99.60	NET TOTALS

EXHIBIT E RESEARCH IN PHYSICS AND CHEMISTRY

TIONS	PAYMENTS
\$65,816.50 \$100,000.00 7,258.84 15,000.00	\$49,806.53 10,767.35
\$73,075.34 \$115,000.00	\$60,573.88
73,075.34	•
42,900.00	:
\$72,100.00	\$60,573.88
1 1 11	\$100,000.00 15,000.00 \$115,000.00 42,900.00 \$72,100.00

EXHIBIT F MENTAL HYGIENE

National Committee for Mental Hygiene	PRIOR APPROPRIA- TIONS	1921 APPROPRIA- TIONS	1921 PAYMENTS
For the work of the Committee in aiding State Commissions on Provision for the Mentally Defective (R.F. 2474, 2508) For studies in the psychopathology of crime (R.F. 2422, 2509) For earrying out its surveys of the care and treatment of mental diseases	\$8,652.43 2,856.75	\$40,000.00 3,500.00	\$41,242.46 3,197.61
For the Committee's work in establishing uniform statistics on mental	7,160.22	35,000.00	22,169.98
diseases (R.F. 2423, 2510) For administration expenses (R.F. 2511, 2512)	663.92	5,000.00	$\frac{4,760.52}{15,000.00}$
Totals. Unexpended balances of appropriations allowed to lapse— R.F. 2473 B.F. 2473 86.175.39	\$19,333.32	\$103,500.00	\$86,370.57
R.F. 2512.	10,958.17	5,000.00	
Net Totals	\$8,375.15	\$98,500.00	\$86,370.57
American Ame			

EXHIBIT G

HOSPITAL, DISPENSARY, AND NURSING STUDIES AND DEMONSTRATIONS

	PRIOR APPROPRIA- TIONS	1921 APPROPRIA- TIONS	1921 PAYMENTS
American Conference on Hospital Service Equipment and maintenance of library service bureau (R.F. 2472, 2595)	\$12,000.00	\$10,000.00	\$15,000.00
Committee for the Study of Public Health Nursing For a study in the proper training of public health nurses (R.F. 2475)	23,642.25	:	21,491.32
Committee on Dispensary Development For maintenance of Service Bureau (R.F. 2481, 2514). For study and experiment in the district dispensary field (R.F. 2575)	5,500.00	27,695.00 7,500.00	28,867.27 2,057.95
For the development of a demonstration dispensary in connection with the Presbyterian Hospital (R.F. 2558)	:	18,000.00	8,830.72
July 1, 1921 to December 31, 1923 (R.F. 2573) (Instalment due 1921)	•	10,000.00	3,888.75
Committee on Training of Hospital Administrators For a study of hospital service (R.F. 2574)	•	15,000.00	1,926.83
Hospital and Dispensary Studies For expenses of studies (R.F. 2461, 2513)	983.89	4,500.00	2,408.39

			11(1)11		
351.48	1=	\$84,822.71		\$84,822.71	
:	10,000.00	\$42,477.62 \$102,695.00		\$41,312.89 \$102,695.00 \$84,822.71	
351.48		\$42,477.62	1,164.73	\$41,312.89	
Public Health Committee of the New York Academy of Medicine For a study of the dispensaries of New York City (R.F. 2399)	Study of Nurse Training in Europe For expenses of study (R.F. 2555)	Totals.	Unexpended balances of appropriations allowed to lapse Committee on Dispensary Development (R.F. 2481)	Net Totals.	

1921

APPROPRIA-

PRIOR APPROPRIA-

EXHIBIT H WAR WORK

	TIONS	TIONS	PAYMENTS
American Social Hygiene Association For demonstration of social hygiene program in war camp community (R.F. 2330)	\$18,495.28	•	\$1,793.75
National Research Council For special work of Division of Medicine and Related Sciences in connection with the war emergency and demobilization period (R.F. 2369).	7,736.08	:	500.00
Rockefeller Institute for Medical Research For war work during 1919 (R.F. 2388)	325.22	:	:
For additional equipment for teaching military and naval surgeons (R.F. 2230)	2,635.97 2,648.18	• • • • • • • • • • • • • • • • • • • •	
War Relief Commission Administration—1917 (R.F. 2216)	3,334.57		388.41
Totals	\$35,175.30	69	\$2,682.16
Unexpended balances of appropriations allowed to lapse American Social Hygiene Association (R.F. 2330)			

	\$2,682.16	,
	\$3,326.91	\$2,758.02 1,482.01 22,875.00 \$27,115.03
31,848.39	\$3,326.91	
Rockefeller Institute for Medical Research (R.F. 2394) 2,648.18 War Relief Commission (R.F. 2216)	Net Totals	Refunds of amounts disbursed in previous years Rockefeller Institute for Medical Research—War work in 1919 (R.F. 2388). Rockefeller Institute for Medical Research—Preparation of Serums (R.F. 2394). Yale University—Mobile Hospital Unit (R.F. 2243)

1921

PRIOR

EXHIBIT I MISCELLANEOUS

RIA- 1921 S PAYMENTS	0.00 \$10,000.00	.00 8,000.00	1,000,000.00			35,000.00	.00 19.304.38		
APPROPRIA- TIONS	\$10,000.00	8,000.00	•			35,000.00	25,000.00	12,500.00	1,500.00
APPROPRIA- TIONS	÷	:	1,000,000.00			:	•	4,967.64	:
American Academy in Rome	For general purposes, \$10,000 a year for ten years beginning 1914 (R.F.215) (Instalment due 1921)	American Medical Association Toward the loss incurred in publishing a Spanish edition of the Journal of the American Medical Association in 1920 (R.F. 2545)	American Relief Administration Toward its work in feeding European children (R.F. 2533)	Committee of Reference and Counsel of the Annual Foreign Missions Conference of North America	For earrying out its program of co-operation and co-ordination in foreign missionary work of the principal American Mission Boards. Total pledge of \$425,000 extending over a period of ten years beginning 1914	(R. F. 228) (Instalment due 1921)	Common Service Committee Demonstration in centralized offices for health agencies (R.F. 2583)	Concilium Bibliographicum, Zürich, Switzerland For expenses during 1920 (R.F. 2463) For expenses during 1921 (R.F. 2519)	Johns Hopkins University For study of fluke disease (R.F. 2568)

			TRE	EASURER'S	S RE	PORT			3	-
15,294.98	850.00	15,000.00	1,000.00	10,000.00	5,000.00	2,299.13	7,712.86	\$171,000.00 \$1,145,822.76	14,987.53 681.39	\$186,700.00 \$1,161,491.68
32,000.00	1,000.00	15,000.00	1,000.00	20,000.00	•	•	10,000.00	\$171,000.00	15,000.00	\$186,700.00
11,186.34	:	•	:	10,000.00	5,000.00	4,078.00	944.98	\$1,036,176.96		\$1,036,176.96
M edical Centers of Europe For supplying the chief medical centers of Europe with important medical journals of America and England (R.F. 2494, 2584)	National Research Council For a study of biological abstracting and bibliography (R.F. 2561)	To bring to a satisfactory condition the buildings, equipment, and naancial affairs of the Concilium Bibliographicum (R.F. 2609)	National Information Bureau For sustaining membership for the year 1921 (R.F. 2546)	New York Association for Improving the Condition of the Poor For providing pensions for dependent widows with families, \$20,000 a year for ten years beginning 1914 (R.F. 239) (Balance of instalment due 1920) (Instalment due 1921)	Rockefeller Institute for Medical Research For studies in animal nutrition (R.F. 2476)	Traveling expenses of George E. Vincent and Abraham Flexner Expenses in connection with their visit to Europe (R.F. 2536)	Grand Chenier Wild Life Refuge Taxes and expenses (R.F. 2433, 2548)	Annual	Furniture and fixtures (R.F. 2524, 2566) Books for the library (R.F. 2525)	Totals

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PRIOR 1921 APPROPRIA- TIONS TIONS TIONS TIONS 12.47 18.61 \$1,778.87 \$ \$1,034,398.09 \$183,950.00 \$ \$18,749.36 \$4,584.00 \$4,584.00		
Jances of appropriations allowed to lapse rations allowed to lapse search Council (R.F. 2566) \$1,778.87 \$		1921 ROPRIA- 1921
lexner (R.F. 2536) \$1,778.87 \$ \$150.00 12.47 18.61	TIONS	TONS PAYMENTS
\$1,034,398.09 \$186,518.92 \$1,034,398.09 \$186,518.92 \$	er (R.F. 2536) \$150.00	· · · · · · · · · · · · · · · · · · ·
\$1,034,398.09 \$186,518.92 \$ \$183,950.00 17,123.34 \$ \$201,073.34	18.61	181.08
\$183,950.00 17,123.34 \$5201,073.34		,518.92 \$1,161,491.68
\$18,749.36 4,584.00	 	,950.00 \$157,209.37 ,123.34 12,913.97
		,073.34 \$170,123.34
: 1	\$18,749.36 4,584.00 1,879.14	,212.50
NET TOTALS. \$175,860.84	÷	,860.84 \$170,123.34

EXHIBIT J

1921 INTERNATIONAL HEALTH BOARD APPROPRIATIONS,*

UNPAID BALANCES OF APPROPRIATIONS MADE IN PREVIOUS YEARS, AND PAYMENTS THEREON MADE IN 1921

	PRIOR APPROPRIA-	1921 APPROPRIA-	1921
Сопиту Неаллн Work	TIONS	TIONS	PAYMENTS
Southern States			
Alabama 1920—(I.H. 2655–60,2937) 1921—(I.H. 21059–67, 21162–63, 21228–30)	\$6,013.46	\$	\$3,555.53 10,453.31
Fiornia Commission (I.H. 21387)	:	262.50	:
1920—(I.H. 2661–6) 1921—(I.H. 21028)	15,200.00	5,000.00	4,525.39
Nansas 1920—(I.H. 2906–7) 1921—(I.H. 21183–89, 21100, 21157)	4,250.00	8,183.32	1,527.58 $3,056.42$
1920—(I.H. 2818, 2879, 2819–23, 21212, 2495) 1921—(I.H. 21084–90)	11,575.55	1,777.46 17,879.17	6,080.81 $11,565.16$
1992-41.H. 21179-81, 21223-25)	•	7,732.89	2,265.58
1921—(I.H. 21164)		4,351.67	•

TREASURER'S REPORT

^{*}The Foundation provides for the cost of work carried on by the International Health Board by making to the Board one or more appropriations to cover its work during the year. From these large grants the Board then makes its own appropriations for specific objects.

 - Company	nanning	
Y	TIGHT	

1921 PAYMENTS	\$4,724.34 7,368.77	:	5,713.41	9,676.10 $6,824.85$	$\substack{5,015.15\\13,220.92}$	3,695.81 $11,147.61$	3,686.78 $9,180.83$	6,472.41 6,348.55	1,004.45 2,288.92 2,488.71
1921 Appropria- tions	\$2,900.00	00.009	9,000.00	14,916.67	31,812.90	15,612.50	13,800.03	14,483.33	9,567.06
PRIOR APPROPRIA- TIONS	\$12,797.45	:	:	12,014.21	6,051.17	5,737.59	4,662.79	16,488.03	1,106.05
COUNTY HEALTH WORK—Continued Southern States—Continued	Mississippi 1920—(I.H. 2751–56, 2880–85) 1921—(I.H. 21019–26, 21108) Missouri	1921—(I.H. 21194)	1921—(I.H. 21068–70)	1920—(I.H. 2824, 2825–32, 2838, 2871, 2872, 2904, 2938) 1921—(I.H. 21113–27) South Carolina	1920—(I.H. 2667–73, 2905) 1921—(I.H. 21034–40, 21136–43) Tennessee	1920—(I.H. 2674-78, 2944). 1921—(I.H. 21041-5, 21205, 21227). Texas	1920—(I.H. 2679–84) 1921—(I.H. 21093–98, 21219–22) Virginia	1920—(I.H. 2685–92, 2768, 21053–55) 1921—(I.H. 21079–83, 21128) West Virginia	1920—(I.H. 2769, 2898, 21017) 1921—(I.H. 21107, 21226, 21101–2, 21176–78) Conference of Health Officers of the Southern States (I.H. 21047)

		TRE	CASUR	ER'S	REPORT			367
633.13 4,343.08	2,218.69 $10,173.56$	3,052.01 $7,282.97$	$\substack{1,210.06\\14,622.41}$	2,130.76 $1,357.64$	42,786.57 96,754.67	403.38	452.04 $5,030.11$	200.00 $1,465.67$
19,196.00	19,440.00	11,000.00	21,980.00	2,700.00	938.00 234,257.09	9,250.00	29,432.67	12,610.00
9,314.01	7,496.77	6,568.89	5,766.06	6,885.86	103,868.24	9,497.68	16,030.54	368.00
Ноокworm Work Central America Costa Rica 1920—(I.H. 2718, 2693) 1921—(I.H. 2969)	Guatemala 1920—(I.H. 2694)	Nicaragua 1920—(I.H. 2725)	Panama 1920—(I.H. 2695). 1921—(I.H. 2972).	Salvador 1920—(I.H. 2696)	South America Brazil 1920—(I.H. 2736, 2743–44, 2746, 2749, 2780–90, 2836, 2939, 2940, 1920—(I.H. 2965, 2945, 21030, 21013, 21078, 2945, 21030, 21014, 56, 21215, 21233, 21246, 21361) 1921—(I.H. 2965, 2974–84, 21071, 21077–8, 21148, 9, 50)	British Guiana 1920—(I.H. 2697) 1921—(I.H. 2989)	Colombia 1920—(I.H. 2724, 2824). 1921—(I.H. 2985–7).	Dutch Guiana 1920—(I.H. 2698) 1921—(I.H. 2990, 21217)

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1921 PAYMENTS		÷		:		1,880.43	7,392.06	Cr. 57.59 10,413.54	1,641.29	0,572.58	:	:	3,403.96	4,787.02
1921 APPROPRIA- TIONS		€		935.00	7,791.00		16,000.00	23,290.00	• • • • • • • • • • • • • • • • • • • •	9,282.80		23,290.00	00 007	11,400.00
PRIOR APPROPRIA- TIONS		\$6,000.00		:	7,791.00	6,047.03		1,169.22	2,067.65	•	611.91	:	5,737.26	:
EXHIBIT J—Continued	Hookworm Work—Continued South America—Continued	Ecuador 1920—(I.H. 2727)	West Indies	Antigua 1921—(I.H. 2988)	J920—(I.H. 2699) 1921—(I.H. 2991)	Jamaica 1920—(I.H. 2700)	1921—(I.H. 2992)	1920—(I.H. 2805) 1921—(I.H. 2993)	St. Lucia 1920— (I.H. 2701)	1921—(1.H. 2995)	1920—(1H. 2806)	1921—(1.H. 2994)	1920—(I.H. 2702)	1921—(1.H. 2996)

		TR	EASU	REF	e's :	REF	OR'	г		369
8,337.20 5,304.31	128.41 660.18	•	4,561.42		491.21	•	114.81	3,434.67 7,997.04		3,556.90 14,423.31
18,500.00	5,745.00	795.50	14,250.00	:	2,000.00	•	114.81	2,783.65 $9,271.00$		3,631.40
25,190.77	2,455.55	•	17,693.85	4,641.88	•	106.52	•	651.02	6,604.50	460.51
The East Australia 1920—(I.H. 2729–34)	Drush North Borneo 1920—(I.H. 29156). D	Driven Solomon Islands [22]—(I.H. 21133)	J920—(I.H. 2771–74, 2776, 2910, 2775) 1921—(I.H. 2997–21000) Farnet	Egypt 1515—(I.H. 237).	191—(I.H. 21355)	120—(I.H. 2942) Monuting	1920—(I.H. 21129)	1920—(I.H. 2779, 21146). 1921—(I.H. 21001).	1920—(I.H. 2703)	Miscellaneous Research in Life History of Hookworm Eggs and Larvae (I.H. 2964) Researchs in Selected Counties in the Southern States (I.H. 2895, 21154, 21216, 2903).

EXHIBIT J—Continued			
	PRIOR APPROPRIA-	1921 APPROPRIA-	1921
Hookworm Work—Continued	SNOLL	TIONS	PAYMENTS
Miscellaneous—Continued Study of the Various Methods of Diagnosis Used in Connection with Hookworm Disease (I.H. 21165) Portable House and Office at Salvador (I.H. 2449, 2614, 2839)	\$428.46	\$1,500.00	\$500.00 75.00
Malaria Work Southern States			
Alabama 1920—(I.H. 2843-45). 1921—(I.H. 21145, 21196-97, 21158-59, 21210)	5,114.50	2,750.00	4,523.35 1,749.01
Arkansas 1920–(I.H. 2888) 1021–(I.H. 21941)	405.00	1 177 85	277.50
Georgia Georgia 1920—(I.H. 2889–91)	450.00	7,111.00	124.11
Louisiana 1920—(I.H. 2794–97, 2837, 2846, 47, 49, 2886–87, 21031–32) 1921—(I.H. 21051, 21106, 21160, 21135)	11,673.67	15,680.05	2,733.10 8,196.61
Mississippi 1920—(I.H. 2873–77, 2757, 2791–92, 2546)	17,116.87		3,931.82
1921—(1.H. 21027, 21111, 21192-3, 21134, 21112, 21198, 21209, 21240)	:	14,775.00	5,375.11
Missouri 1921—(I.H. 21211)	:	833,33	:

	TREA	SURER'S	REPO	RT	371
6,004.51 5,463.18 10,397.32	2,388.68	1,501.27	228.16 165.63	2,728.44	2,070.14
12,660.57	1,450.00	1,218.75 50,000.00 245.00	300.00	5,507.00	3,000.00
9,013.50	2,717.00	4,350.00	352.37		2,748.48
North Carolina 1920—(I.H. 2798–801) 1921—(I.H. 21110, 21152, 21239) South Carolina 1920—(I.H. 2760, 2762–63, 21050, 2936) 1921—(I.H. 21072–6, 21200–3, 21242–5)	1920—(I.H. 2892–93) 1921—(I.H. 21161, 21175). Texas 1920—(I.H. 2850–55).	-1920—(I.H. 2811–15) 1921—(I.H. 21199) Malaria Control—Supervision (I.H. 2962) Conference of Malaria Workers (I.H. 2948, 21238) Concentive Domonstration in Malaria Control	(I.H. 2856) Study to determine source of blood meals of Anopheles mosquitoes (I.H. 21213).	Central America Nicaragua 1921—(I.H. 21174, 21057)	Argentina—Survey (I.H. 21046) Ecuador 1920—(I.H. 2726)

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EXHIBIT J-Continued

THE ROCKEFELLER FOUNDATION

	PRIOR APPROPRIA-	1921 APPROPRIA- THONS	1921	,
Malaria Work—Continued West Indies			FAIMENIS	
Porto Rico 1920—(I.H. 2807). 1921—(I.H. 21191, 21109, 21018).	\$1,258 .32	\$. 21,120.00	\$607.78 13,382.22	
YELLOW FEVER				
Ecuador 1920—(I.H. 2728) 1921—(I.H. 21204)	6,270.10	2,000.00	1,381.09	
Mexico and Central America 1920—(I.H. 2575). 1921—(I.H. 21058, 21360).	609.29	138,600.00	76,949.96	
Peru 1921—(I.H. 21354, 21103, 21131, 21155, 21208)		90,000.00	17,681.12	
Epidemic Work 1920—(I.H. 2909). 1921—(I.H. 21048).	26,472.52	3,000.00	10,011.55 2,605.05	
Associates of Director—Salaries, Traveling Expenses, Equipment and Supplies 1920—(I.H. 21016)	14,862.46	•	11,040.91	
Brazil 1921—(I.H. 21214)		1,000.00	•	

		TREA	SURER	's REI	PORT		373
7,636.13 73,274.03	93,615.57 26,727.85	$27,954.32\\66,824.56$	16,431.31 $33,452.18$	11,758.73 80,526.57	•	750.00	5,049.88 15,706.51
108,057.00	74,540.00	109,484.20	78,212.00	149,272.40	50,000.00	10,000.00	$\substack{1,629.49\\21,000.00}$
62,868.56	103,913.81	74,435.68	106,005.23	155,501.27	:	•	3,420.39
Tuberculosis in France Central Administration 1920—(I.H. 2706) 1921—(I.H. 21004, 21231).	Departmental Organization 1920—(I.H. 2710) 1921—(I.H. 21008)	Educational Division 1920—(I.H. 2709) 1921—(I.H. 21007, 21232)	Medical Division 1920—(I.H. 2707) 1921—(I.H. 21005)	Public Health Visiting 1920—(I.H. 2708) 1921—(I.H. 21006)	Public Health Administration 1921—(I.H. 21009)	Contingent Fund 1921—(I.H. 2963)	Ровыс Неактн Ерисатом Brazil São Paulo—Department of Hygiene 1920—(I.H. 2704, 21362) 1921—(I.H. 21002, 21132)

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J	1	4

EXHIBIT J-Continued

THE ROCKEFELLER FOUNDATION

namina — outilized			
	PRIOR APPROPRIA-	1921 APPROPRIA-	1921
Public Health Education—Continued	TIONS	TIONS	PAYMENTS
Czechoslovakia			
Institute of Public Health (I.H. 21207, 21391)	e:	\$250,000,00	v
		00.000,000	•
Grants to doctors for study of public health (I.H. 2958–60, 21403–4, 21130)		190 400 00	K9 0K6 94
Public Health Institutes		120,100.00	40,000.04
Alabama—Birmingham—(I.H. 21374)		175.00	
Georgia—(I.H. 21092)		550.00	462.50
New York—Albany—(I.H. 21363)	:	368.00	
N. Y. City—(1.H. 21147)	:	1,075.00	1,075.00
Michigan—Langing—(1.H. 21195)	:	660.00	656.77
Ohio—Columbus—(I.H. 21237)		595.82 193.81	595.82 193.81
Health Officers' Correspondence Study Course-Ohio			
(I.H. 21375)	:	125.00	
Public Health Laboratory Service			
United States Kansas—(I.H. 21099, 21182, 2896)	979.17	4,500.00	2,175.54
Foreign Gnatemala—(TH 21235)		1 500 00	10 00
Nicaragua—(I.H. 21236)		1,000.00	10.00
Salvador—(I.H. 21234)		1,500.00	
Demonstrations—(I.H. 21144)		300.00	00.6

	TRE	ASURER	's F	REPOR	T		3	375
271,678.61 84,565.48 34,502.16 371.60	2,671.91 5,040.95 86.66 201.67 618.39	22,836.35	4,982.25	125.98 1,584.74 .85	10,153.44		7,498.39 122,990.56	\$1,721,563.36
300,000.00 90,000.00 60,000.00 700.00	5,000.00 11,000.00 1,000.00 500.00 3,000.00	26,500.00	10,000.00	140.00	18,000.00		7,800.00 140,086.00	\$2,824,707.19
94,857.74 13,084.93 38,684.78	145.38	26,757.64		1,982.27	465.31	2,000.00	• • • • • • • • • • • • • • • • • • • •	\$1,157,160.44
ADMINISTRATIVE FIELD STAFF Salaries—(I.H. 2644, 2949). Traveling expenses—(I.H. 2951, 2646). Commutation (I.H. 2954). Medical examinations (I.H. 2955). Drugs for conserving health (I.H. 2954).	Bonding—(I.H. 21091) Traveling expenses of families (I.H. 2647, 2952, 21153). Study leave—(I.H. 2953). Tuition—Staff members in training—(I.H. 2956). Automobiles for directors in training—(I.H. 2957).	Miscellaneous Czechoslovakia Public health work—(I.H. 2935, 2961). Frances freight and exchange (I H. 2967)	Field equipment and supplies (T.H. 2966). Expenses of Dr. F. C. Yen in connection with the compilation of a mining	sanitary code (I.H. 21373). Motion picture film on hookworm disease—(I.H. 2835, 2947). Massachusetts public health survey—(I.H. 2767).	Pamphlets and charts (I.H. 2968, 21359). Study of teaching of hygiene (I.H. 21011). Survey and exhibits—(I.H. 21003).	Tranning of British bacteriologist in the Noguchi yellow fever technique— (I.H. 2817) Expenses in connection with visit to the United States of Brazilian seinn.	tists—(I.H. 21104, 21206, 21105). Administration—(I.H. 21010, 21151, 21190).	TOTALS CARRIED FORWARD

EXHIBIT J-Continued

	PRIOR APPROPRIA- TIONS	1921 APPROPRIA- TIONS	1921 PAYMENTS
Miscellaneous—Continued			
TOTALS BROUGHT FORWARD	\$1,157,160.44	\$1,157,160.44 \$2,824,707.19 \$1,721,563.36	\$1,721,563.36
Appropriations for expenditures made in certain foreign countries are based on fixed rates of exchange. This amount represents the difference between the cost at the fixed rate and the actual cost of such exchange items	:	•	92,311.22
Unexpended balances of appropriations allowed to lapse—Prior Year. \$393,988.72	773,012.89	:	:
Difference in exchange as above 92,311.22	:	486,299.94	:
Net Totals*	\$384,147.55	\$384,147.55 \$2,338,407.25 \$1,629,252.14	\$1,629,252.14
Refund on prior year appropriation— China (I.H. 2549).			

*The Foundation appropriated to the International Health Board for its work during the year 1921 the sum of \$2,500,000.

EXHIBIT K

1921 CHINA MEDICAL BOARD APPROPRIATIONS,*

UNPAID BALANCES OF APPROPRIATIONS MADE IN PREVIOUS YEARS, AND PAYMENTS THEREON DURING THE YEAR 1921

APPROPRIA-

APPROPRIA-

PRIOR

	TIONS	TIONS	PAYMENTS
Hospitals of Missionary Societies			
American Baptist Foreign Mission Society			
Ningpo—salaries of doctor and nurse, \$2,250 a year for five years begin-			
ning 1920 (C.M. 276)			
(Instalment for 1920)	\$2,250.00	· · · · · · · · · · · · · · · · · · ·	
(Instalment for 1921)		2.250.00	
Shaohsing—Support of foreign nurse, Chinese manager, and foreign			
doctor, \$2.475 a year for five years beginning 1920 (C.M. 277)			
(Instalment for 1920)	2.475.00		750.00
(Instalment for 1921)	(-	2 475 00	
Shaphsing continued to residences for physician nurse and Chinese		20.01.6	
chaff (C M 979 9910)	5 695 00		
Sugar (O.M. 210, 2013)	0,020.00		
American Board of Commissioners for Foreign Missions			
Fenchow—Buildings and equipment (C.M. 2517)		15,000.00	15,000.00
Fenchow—Buildings and equipment. Mex. 6.250.00 (C.M. 2518).		4,000.00	
Fenchow—Salaries of additional staff \$3 700 a year for five years begin-			
ning 1921 (C.M. 2519)			
(Instalment due 1921)		3,700.00	
s. Mex. 2.5			
1921 (C.M. 2520)			
(Installment due 1921)		1,500.00	
# The Decemberies asset it and to see the control consists of male and the China Madical Roand by making to the Brand one or more annumisations to sover	Ling to the Board	no or more approp	riations to sover

TREASURER'S

REPORT

^{*} The Foundation provides for the cost of work carried on by the China Medical Board by making to the Board one or more appropriations to cover its work for the year. From these large grants the Board then makes its own appropriations for specific objects.

EXHIBIT K—Continued

378	1	THE RO	OCKE.	FELLER 1	FOUNDA	TION		
1921 PAYMENTS		· · · · · · · · · · · · · · · · · · ·	3,593.50	712.70 237.55 1,000.00	:		6,000.00	:
1921 APPROPRIA- TIONS		•	•	950.25	3,636.00	•	5,250.00	2,400.00
PRIOR APPROPRIA- TIONS		\$11,796.60	7,634.25	712.70	:	8,800.00	6,000.00	:
EXHIBII K—Continued	HOSPITALS OF MISSIONARY SOCIETIES—Continued American Board of Commissioners for Foreign Missions—Continued	Tehchow—Salary of two doctors, \$3,236 a year for hve years beginning 1915 (C.M. 211, 294) (Balance due on instalments)	1916 (C.M. 297, 2229) (Balance due on instalments)	period of four years beginning 1918 (C.M. 2360) (Balance due on previous instalments) (Instalment due 1921) Tehchow—Toward cost of an electric lighting plant (C.M. 2497). Tehchow—Support of successor to Dr. Lee M. Miles, \$1,091 a year for	five years beginning 1921. To cover one half of loss on exchange \$2,545. (C.M. 2498) (Instalment due 1921) Board of Foreign Missions of the Methodist Episcopal Church	Feking—22a.rry of doctor, \$2,400 a year for five years beginning 1910 (C.M. 223, 2102) (Balance due on instalments)	extending over a period of five years beginning 1920 (C.M. 2266) (Instalment due 1920) (Instalment due 1921) (Instalment due 1921) Peking—Support of two dentists, \$2,400 a year for five years beginning	1921 (C.M. 2522) (Instalment due 1921)

		TREAS	urer's	S REPOR	RT		379
		4,125.00	13.514.15		10,000.00		
8,000.00	: :	7,250.00	30,000,00	9,500.00	:	825.00	450.00
	2,100.00	7,250.00	1,800.00	9,500.00	20,000.00	1,650.00	825.00
Peking—Residences for two dentists (C.M. 2523) Peking—Initial equipment for dental department (C.M. 2540). Wuhu—Salary and allowance of doctor, \$900 a year for five years begin-	(Balance due on instalments) Wuhu—Building of hospital and residences (C.M. 2384) Wuhu—Salaries of additional staff and maintenance expenses, \$7,250 a	year for five years beginning 1920 (C.M. 2589) (Instalment due 1921) Wuhu—Buildings and equipment (C.M. 2499) Board of Missions of the Methodist Episcopal Church, South Soochow—Salary of nurse, \$600 a year for five years beginning 1916	(C.M. 236, 2105) (Balance due on instalments) Soochow—Buildings and equipment, Mex. 50,000 (C.M. 2417, 2500).	Soochow—Maintenance of additional foreign staff, Mex. 8,000 a year for five years beginning 1920 (C.M. 2418). (Instalment due 1920). (Instalment due 1921).	Board of Missions of the Methodist Episcopal Church, South—American Baptist Foreign Mission Society, Jointly Huchow—Building and equipment (C.M. 2151) Huchow—Support of foreign physician, \$5,025 extending over a period	of five years beginning 1920 (C.M. 2152) (Instalment due 1920). (Instalment due 1921). Huchow—Support of foreign nurse, \$3,000 extending over a period of	tive years beginning 1920 (C.M. 2153) (Instalment due 1920) (Instalment due 1921)

1921

PRIOR

EXHIBIT K—Continued

	APPROPRIA- TIONS	APPROPRIA- TIONS	1921 PAYMENTS
ospitals of Missionary Societies—Continued Board of Missions of the Methodist Episcopal Church, South—American Baptist Foreign Mission Society, Jointly—Continued Huchow—Support of Chinese physician, \$2,250 extending over a period of five years beginning 1920 (C.M. 2154) (Instalment due 1920) (Instalment due 1921) Board of Foreign Missions of the Presbyterian Church in the U.S. A.	\$450.00	\$	
Changton—Current expenses, \$4,020 a year for five years beginning 1910 (C.M. 2144) (Balance due on instalments)	8,193.75	: : :	1,725.00
(Instalment due 1920) (Instalment due 1921) (Instalment due 1921) Chefoo—Salary and allowance of doctor and nurse, \$2,625 a year for	2,250.00	2,250.00	2,250.00 $2,250.00$
five years beginning 1917 (C.M. 284) (Balance due on previous instalments) (Instalment due 1921) Chefoo—Operating expenses, \$2,250 a year for five years beginning	8,433.80	2,625.00	1,247.50
1918 (C.M. 2243) (Instalment due 1921). Chefoo—New boiler for heating plant (C.M. 2515). Hwaivuen—Salary and allowance of physician and nurse and operating		2,250.00 $1,500.00$	2,250.00 $1,500.00$
expenses, \$3,375 a year for five years beginning 1919 (C.M. 285) (Balance due on previous instalments). (Instalment due 1921).	6,000.00	3,375.00	1,650.00

		TRE	ASU	RER'S	REPO	RT	381
	4,050.00	900.00	750.00	•		4,500.00	• •
:			:	:	1,881.00	4,500.00	2,250.00
2,250.00	18,075.00	00.006	1,187.50	2,025.00	1,881.00		1,500.00
Hwaiyuen—Residence of doctor and equipment (C.M. 286)	(Balance due on installments)	(Instalment due 1920) (Instalment due 1921) Shuntehfu—Maintenance, \$750 a year for five years beginning 1916 (C.M. 2142)	(Balance due on instalments)	Hope and Wilhelmina Hospital—Purchase of pump, well, engine, and electric light plant (C.M. 2282). Hope and Wilhelmina Hospital—Support of physician, \$1,881 a year for five years beginning 1920 (C.M. 2283)	(Instalment due 1920) (Instalment due 1921)	Canton—Salary Onege Canton—Salary Onege year for five years beginning 1917 (C.M. 2139) (Instalment due 1921) Canton—Current expenses 1921–22, Mex. 9,000 (C.M. 2541) Church of Scotland Foreign Mission Committee Ichang—Support of third foreign doctor and nurse, \$2,250 a year for	(Balance of instalment due 1920) (Instalment due 1921)

382	THE	ROCKEFI	ELLER I	FOUNDA	TION	
1921 PAYMENTS		\$2,475.00 1,950.00 3,257.44	:	: :	: :	: :
1921 APPROPRIA- TIONS		\$:	: :	4,100.00	1,400.00
PRIOR APPROPRIA- TIONS		\$3,825.00 5,500.00	13,625.00	500.00 4,800.00	4,100.00	1,400.00
HOSPITALS OF MISSIONARY SOCIETIES—Continued	Domestic and Foreign Mission Society of the Protestant Episcopal Church in the U. S. A. Anking—Operating expenses, \$4,200 a year for five years beginning 1919 (CM 29308)	(Balance due on previous instalments) (Instalment due 1921) Anking—Residence of physician, Mex. 6,000 (C.M. 2361) Executive Committee of Foreign Missions of the Presbyterian Church in the II S. South	Soochov—Salary, outfit, and travel to field, of foreign nurse; Kashing—Salary, outfit, and travel to field, of foreign nurse. Salaries, \$3,600 a year for five years beginning 1915 (C.M. 221, 2101) (Balance due on instalments)	Foreign Christian Missionary Society Luchowfu—Buildings and fixed equipment (C.M. 2327) Luchowfu—Movable equipment (C.M. 2328) Luchowfu—Maintenance \$4,100 a year for five years beginning 1920	(Instalment due 1920) (Instalment due 1921) (Instalment due 1921) Luchowfu—Salary of second foreign nurse, \$1,400 a year for five years hearnning 1920 (CM, 9320)	(Instalment due 1921) (Instalment due 1921) Luchowfu—Salary of business manager, \$1,400 a year for five years beginning 1920 (C.M. 2331)

(Instalment due 1920). (Instalment due 1921). Luchowfu—Salary and allowance of doctor and nurse; Nantungchow—Salary and allowance of nurse, \$4,200 a year for five years beginning 1918 (C.M. 215, 2100)	1,400.00	1,400.00		
(Balance due on previous instalments)	9,405.00	4,200.00		
(Instalment due 1920). (Instalment due 1920). (Instalment due 1921). oreign Mission Board of the Southern Baptist Convention (Chengelhow—Salary of doctor. \$1,200 a year for five years beginning	1,800.00	1,650.00		TREAS
(Balance due on instalments) (Wanghing—Salary of physician, \$900 a year for five years beginning	3,250.00	:	•	SURER'
(Instalment due 1920) (Instalment due 1921) (Hwanghien—Outfit and travel of physician (C.M. 282) Hwanghien—Salary of nurse, \$600 a year for five years beginning 1916	900.00	00.006		S REPOR
(C.M. 225, 2103) (Balance due on instalments) Laichowfu—Equipment and outgoing expenses of physician and wife (C.M. 280) Laichowfu—Salary of physician and wife and nurse, \$1,650 a year for	1,500.00			RT
five years beginning 1920 (C.M. 279) (Instalment due 1920) (Instalment due 1921) (Instalment due 1921) (Instalment due 1921)	1,650.00	1,650.00	· · · · · · · · · · · · · · · · · · ·	3
(S.M. 202, 2104) (Balance due on instalments)	1,625.00	•		83

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1921 PAYMENTS		÷				•		750.00		9,250.00
1921 APPROPRIA- TIONS		\$1,000.00			750.00	:		750.00		9,250.00
PRIOR APPROPRIA- TIONS		÷		00.009	1,500.00	1,702.22		1,500.00		18,500.00
EXHIBIT K—Continued	HOSPITALS OF MISSIONARY SOCIETIES—Continued Foreign Mission Board of the Southern Baptist Convention—Continued	Yangchow—Maintenance Mex. 2,000 a year for five years beginning 1921 (C.M. 2525) (Instalment due 1921)	London Missionary Society Siacchange—Support of nurse, \$600 a year for five years beginning 1920	(D.M. 2101) (Instalment due 1920) (Instalment due 1921) (Instalment due 1921) (Instalment due 1921)	(C.M. 2326) (Balance due on previous instalments)(Instalment due 1921)	Medical Mission Auxiliary of London Tai Yuan Fu—Improvements and supplies (C.M. 2201)	United Free Church of Scotland Mukden—Support of nurse, \$750 a year for five years beginning 1918	(C.M. 2252) (Balance due on previous instalments)(Instalment due 1921)	University of Nanking Nanking—Current expenses, \$9,250 a year for five years beginning 1917	(Balance due on previous instalments)

			TREAS	surer's	S REPO	RT		3 ⁸ 5
		20,076.59	2,971.46		22,778.24	6,645.00		• • •
	500.00	150,000.00	2,000.00		50,000.00	6,645.00		5,000.00
	500.00	:	1,850.13		25,000.00	6,645.00		2,500.00
Women's Foreign Missionary Society of the Methodist Episcopal Church Kiukiang—Salary of nurse, \$500 a year for five years beginning 1919	(C.M. 2359) (Instalment due 1920)	Loss in Exchange To cover loss in exchange on payments to missionary societies for their hospitals (C. M. 2503)	Emergency Fund For aid of medical work in China, at the discretion of the resident director (C.M. 2456, 2512)	Missionary Societies—Hospitals and Pre-Medical Education Yale Foreign Missionary Society Hunan-Yale Medical School, Changsha—Salaries and expenses of staff of the Foreign of the School and nurses, fraining school. Mex	41,605 per year for five years beginning July 1, 1920 (C.M. 2454) (Instalment due 1920) (Instalment due 1920) (Instalment due 1921)	Human-rate Archives 1900, and nurses' training school, \$6,645 a of hospital, pre-medical school, and nurses' training school, \$6,645 a year for five years beginning July 1, 1920 (G.M. 2455) (Instalment due 1920) (Instalment due 1921)	Hospitals Under Chinese Management Gentral Hospital, Peking Salaries of Chinese doctor and nurse, \$5,000 a year for three years begin-	ning 1920 (C.M. 2464) (Balance of instalment due 1920)

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1921 PAYMENTS	\$28,263.70 647,311.75 23,534.45 5,020.52 169,259.75 234,809.92 37.56 6,735.71	Cr. 1,577.39 358,255.38 11,152.80	11,110.03 10,693.92	3,415.96 298.67 20.906.80	
APPROPRIA- TIONS	\$50,000.00 125,000.00 90,000.00	350,000.00 300,000.00 50,000.00 7,500.00 10,000.00	50,000.00 17,000.00 20,000.00	5,000.00	
APPROPRIA- TIONS	\$76,414.87 355,631.80 23,434.70 9,000 213,356.96 216,742.96 8,179.18 15,350.45	717.95 234,745.95		4,492.50	
Medical Education	Medical Schools Affiliated Peking Union Medical College Asset Accounts Purchase of additional property (C.M. 213, 248, 249, 2170, 2213, 2381) (C.M. 213, 248, 249, 2170, 2213, 2381) Buildings and fixed equipment (C.M. 2492, 2495) Alterations to original buildings (C.M. 2407, 2537) Street Improvements (C.M. 2408) Accessories (C.M. 2410, 2496, 2516, 2529, 2544) Heavy furniture for staff residences (C.M. 2378) Library (C.M. 2440) Operation	Budget 1919–20 (C.M. 2493) Budget 1920–21 (C.M. 2441) Budget 1921–22 (C.M. 2524, 2535) Peking American School (C.M. 2561) Diet investigation work (C.M. 2539) Expenses of visiting professors (C.M. 2538) Travel and expenses of trustees in attending dedication of College	(C.M. 2494). Insurance (C. M. 2514) Contingent Fund (C.M. 2536) Expenses in America	Year 1920–21 (C.M. 2481, 2475). Year 1921–22 (C.M. 2534). Shanghai Medical School Asset Accounts Purchase of land (C.M. 2269, 2429).	

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20,823.27 Cr. 671.05	:	i i	7,908.60	01.700,01			00.010.c	22,916.00	10,000.00	2,700.00	87 60.000,01
• • • •	:		19.382.16	3,400.00		19 000 61	12,000.00	•	10,000.00	2,700.00	10,000.00
48,977.03 4,960.24 2,328.95	4,230.48	10 090 01	10,200.00		10 000 01	00.000,01		22,910.00	•	•	•
Buildings and fixed equipment (C.M. 2413) Accessories (C.M. 2272) Library (C.M. 2215)	December 1918-19 (C.M. 2277)	Shantung Christian University Medical School To cover loss in exchange in connection with appropriations (C.M. 951 959 9317 9388)	Toward its general budget for the year 1921–22, Mex. 33,000. (C.M. 2531, 25, 1)	Yale Foreign Missionary Society Hunan-Yale Medical School, Changsha—Heating plant for laboratory building (C.M. 2527)	Pre-Medical Education Canton Christian College Fourinment, (C.M. 2443)	nd o	Fukien Christian University Puliding and American for a control of the control o	Salaries of six instructors, \$10,000 a year for five years beginning 1919 (C.M. 2274)	(Instalment due 1921). Salaries of Chinese instructors, \$2,700 a year for five years beginning 1919 (C.M. 2275)	(Instalment due 1921). Maintenance of science department, \$10,000 a year for five years beginning 1919 (C.M. 2276)	(Instalment due 1921).

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1921 Payments			\$2,064.00 1,236.00	00.000,6	6,300.00	00.006,1		6,117.82	:	250.87	27,422.82
1921 APPROPRIA- TIONS			\$.2,400.00	•	6,300.00	1,500.00		•	5,000.00	600.00	44,150.00
PRIOR APPROPRIA- TIONS			\$2,400.00	6,000.0	• • •	:		12,000.00	•		
EXHIBIT K—Continued	Pre-Medical Education—Continued Ginling College	Salary of teacher of physics, \$2,400 a year for five years beginning 1920 (C.M. 2402)	(Instalment due 1920) (Instalment due 1921) Scientific equipment (C.M. 2403)	St. John's University, Shanghai Maintenance expenses, \$18,800 extending over a period of four years beginning 1920 (C.M. 2415)	(Instalment due 1921) Books and periodicals (C.M. 2543) Summert of instanctor, 1001-99 (C.M. 9599)	TRANSLATION	China Medical Missionary Association—Publication Committee For use in translation work, Mex. 10,000 a year for two years beginning 1919 (C.M. 2423)	(Instalment due 1920). For use in translation work, Mex. 8,000 a year for two years beginning	(Instalment 1921) National Medical Association of China	For expenses connected with their participation in the terminology committee, Mex. 500 a year for five years beginning 1920 (C.M. 2453) (Instalment due 1921).	Fellowships and Scholarships C.M. 2504, 2505, 2510

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Committee of Reference and Counsel of the Foreign Missions Conference of North America	Toward expenses of survey of education under missionary auspices in China (C.M. 2533)	
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Toward cost of recitation building and library, Mex. 40,000 (C.M. 2502) Repairs and equipment, Mex. 5,000 (C.M. 2513) For purchase of ledgers, forms, etc. (C.M. 2509)..... Model System of Mission Hospital Accounting North China Union Language School

National Medical School, Peking Toward purchase of new site, Mex. 12,000 (C.M. 2526)...... Sanitary work in connection with the Chinese famine relief (C.M. 2508) Famine Relief

For studies in and about Peking (C.M. 2511)..... Studies of Pre-Medical Education

Totals Peking Office..... Home Office.... ADMINISTRATION

Unexpended balances of appropriations allowed to lapse..... NET TOTALS*

Refunds on appropriations—

Peking Union Medical College—Original property (C.M. 212)

Peking Union Medical College—Property of Prince Yu (C.M. 239)

Harvard Medical School of China (C.M. 227)

*The Foundation appropriated to the China Medical Board for its work during the year 1921 the sum"of \$2,115,787.00.

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\$1,955	\$1,854,646.14	\$1,652,874.14
\$1,955	\$2,116,839.91 262,193.77	\$1,694,568.16 41,694.02
93	99,599.00 33,267.00	19,894.38
;	500.00	:
:	10,000.00	:
22	6,000.00	
:01	45,000.00 3,000.00	
87	2,000.00	:
:	0,000,00	

\$7,759.48 16,144.64 28,800.00 \$52,704.12

EXHIBIT L

SUMMARY OF APPROPRIATIONS AND PAYMENTS

PRIOR

	APPROPRIA-	APPROPRIA-	1921
	TIONS	TIONS	PAYMENTS
INTERNATIONAL HEALTH BOARD	\$384,147.55	\$2,338,407.25	\$1,629,252.14
Medical Education.	1,022,014.14	2,500,583.71	2,156,216.68
SCHOOLS OF HYGIENE AND PUBLIC HEALTH. RESEARCH IN PLYSTICS AND CHEMISTERS.	282,143.13	783,247.74	323,374.87
MENTAL HYGIENE	8,375.15	98,500.00	86,370.57
HOSPITAL, DISPENSARY, AND NURSING STUDIES AND DEMONSTRATIONS WAR WORK	$41,312.89 \ 3,326.91$	102,695.00	$84,822.71 \\ 2,682.16$
MISCELLANEOUS	1,034,398.09	186,518.92	1,161,491.68
ADMINISTRATION		175,860.84	170,123.34
Totals	\$3,550,796.60	\$8,112,559.60	\$7,630,358.49
Prior Appropriations. 1921 Appropriations.	\$3,550,796.60 8,112,559.60		
Total Appropriations.		\$11,663,356.20 7,630,358.49	
Balance payable on Appropriations=			\$4,032,997.71

In addition to the foregoing, the Foundation has made pledges and appropriations which become fective in future years. These will require for payment the following amounts: effective in future years.

\$19,186,396.40

							\$6,280,746.40 4,619,892.00	3,460,067.00	2,596,191.00	2,229,500.00
49	1,200,000.00	1,6	•		• •	500,638.40				
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INTERNATIONAL HEALTH BOARD	CHINA MEDICAL BOARD	Medical Education	MENTAL HYGIENE	Research in Physics and Chemistry	Schools of Hygiene and Public Health	MISCELLANEOUS	1923	1924	1925	1926
INTERNA	SE	Mei	ME	RES	SCH	Mis	YEAR	YEAR]	YEAR	Year 1926

STATEMENT OF APPROPRIATIONS AND PAYMENTS OF SPECIAL FUNDS DURING THE YEAR 1921 EXHIBIT M

1921

PRIOR

	1101011	1701	
DIAPIG	APPROPRIA-	APPROPRIA-	1921 PAYMENTS
Estate of Laura S. Rockefeller Fund Fifth Avenue Baptist Church (R.F. 2454)	\$28,688.86	€	\$28,688.86
LAURA S. ROCKEFELLER PUND			
Baptist Home for the Aged of New York City (R.F. 2529)		\$500.00	\$500.00
Baptist Home of Northern Ohio (R.J. 2527)		1,500.00	1,500.00
Ministers and Missionaries Benefit Board of the Northern Baptist Convention (R.F. 2526)		500.00	500.00
	-	\$3,000.00	\$3,000.00
JOHN D. BOCKEPELLER FUND			
Baptist Home for the Aged of New York City (R.F. 2530, 2531)		\$1,850.00	\$1,850.00 \$1,850.00
	[The second secon	

EXHIBIT N

STATEMENTS OF PRINCIPAL FUNDS

General Fund	
Balance of Mr. Rockefeller's gifts December 31, 1921	\$171,204,624.50
The whole fund is invested in securities.	
RESERVE	
Balance December 31, 1920. Gain on securities sold and redeemed during the period January 1, 1921–December 31, 1921 (Exhibit P). Gain on sale of land in China.	\$3,111,288.56 63,169.24 16,075.20
	2006
Total	\$3,190,533.00
The whole fund is invested in securities.	
LATTRA S. ROCKERELLER FITADS	
Gifts comprising four separate funds	\$49,300.00
The total of these funds is invested in securities.	
John D. Rockefeller Fund	
Gifts	\$37,000.00
The whole fund is invested in securities.	
Henry Sturgis Grew Memorial Fund	
Gift to Harvard Medical School of China transferred to the Foundation in trust	\$25,000.00
The whole fund is invested in securities.	
ARTHUR THEODORE LYMAN ENDOWMENT	
Amount received from Harvard Medical School of China and held as a principal fund for Shanghai Med-	85 500 00
	20:000
The whole fund is invested in securities.	

EXHIBIT O

LAND, BUILDINGS, AND EQUIPMENT FUNDS

	es DECEMBER 31, 1921	\$3,242.95	3 31,737.00	\$34,979.95	\$171,013.29 6 202,145.46 5 6,925,914.91 122,299.75 379,902.79 3879,066.96 6,858.38 71,385.26 5,020.52
	expenditures 1921	\$681.39	14,987.53	\$15,668.92	\$
NET EXPENDI-	TURES TO DECEMBER 31, 1920	\$2,561.56	16,749.47	\$19,311.03	\$171,013.29 190,026.40 6,278,603.16 98,765.30 210,643.04 164,257.04 6,649.55
	The Rockepeller Foundation	Library \$21,769.19 Equipment \$21,769.19 Less depreciation 5 019 79	:	NET TOTALS, The Rockefeller Foundation	CHINA MEDICAL BOARD Peking Union Medical College: Original purchase Original purchase Additional land New buildings Alterations—original buildings. Alterations—original buildings. Accessories Heavy furniture for staff residences Library Street improvements.

							070
291,491.54 56,654.54 39.76 39.76		\$8,631,832.92	\$8,666,812.87	\$24,330.75 7,528,504.66	\$7,552,835.41 42,250.25	\$7,510,585.16 1,156,227.71	\$8,666,812.87
20,906 80 20,823.27		\$7,491,274.13 \$1,140,558.79	\$1,156,227.71	: : : : : : : : : : : :			
270,584.74 35,831.27 39.76 39.76		\$7,491,274.13	\$7,510,585.16				
Shanghai Medical School: Land New buildings. Moyable equipment. Accessories Library Less donations to universities 671.05	Harvard Medical School	Ner Torals, China Medical Board	Net Grand Totals	Expenditures to December 31, 1920 The Rockefeller Foundation	Less credits listed above	Balance 1920 and prior years Expenditures during 1921	Net Total December 31, 1921

...

STATEMENT OF TRANSACTIONS RELATING TO INVESTED FUNDS EXHIBIT P

General Fund Securities Sold, Redeemed, or Exchanged

GAIN	\$11,032.39 345.85 30,000.00 125.00				21,666.00			\$63,169.24
TOTAL PROCEEDS	\$1,499,861.76 36,000.00 1,000,000.00 50,000.00	79,611.10	104.16		550,553.50	89,350.00	1,500.00	\$3,306,980.52
RATE PER CENT	ひ 4							
NAME Frs. 20,340,500 Belgian Government Treasury Notes for Restoration of	Currency New York Central Lines Equipment Philadelphia Co. Convertible Debenture Wheeling & Lake Erie R.R. Equipment Trust Series "B"			Shares Standard Oil Co. (New Jersey) Common, of a par value of \$100, exchanged for 196,000 shares of a par value of \$75.	$\infty \infty$	Woman's Hotel Co., liquidating dividend of 5%, re-	Stocksociates of social, and ciculated to cold on	
Frs. 20,340,500	\$36,000 \$1,000,000 \$50,000		29,718	49,000	2,900 450			

SECURITIES PURCHASED OR RECEIVED THROUGH EXCHANGE

		RATE	PRICE PER CENT	COST
	NAME	77777		
Frs. 20,340,500	Frs. 20,340,500 Belgian Government Treasury Notes for Restoration of	ų	99 22071	99 22071 \$1.488.829.37
040	Currency	Þ		100
	National Bank and 450 shares Superior Savings & Trust		10-4	
	Co. Taken into books at the combined cost of the two		177 8538	168.961, 10
	old issues		2000	
	Chehalis & Pacific Land Co., assessment of 44% on 220			1.045.00
	shares added to cost of stock			1,010,0
118,872	Shares Standard Oil Co. (Indiana), of a par value of \$25,			
•	received in exchange for 29,718 shares, of a par value			
	of \$100.			
178,308	Shares Standard Oil Co. (Indiana), of a par value of \$25,			
1	received in payment of 150% stock dividend.			
4,964	<u>2</u> 2			
196,000	Shares Standard Oil Co. (New Jersey) Common, of a par			
	value of \$25, received in exchange for 49,000 shares of a			
	par value of \$100.			
				\$1.658.835.47

I, 1921, REPRESENTING ESTED DECEMBER 31 SECURITIES IN GENERAL FUNDS ON DECEMBER 31 BOTH PRINCIPAL AND INCOME TEMPORARILY INVI EXHIBIT Q OFSCHEDULE

BONDS

NAME	INTEREST	DATE OF		PRICE	AMOUNT PRICE ROOK VALUE
	Per Cent	MATURITY		PER CENT	
American Agricultural Chemical Co. First Mortgage	1	700		Ç	
American Telephone & Telegraph Co. Thirty-year	ဂ	Oct. 1928	\$310,000 101.	101.	\$313,100.00
Collateral Trust	20		3 100,000 97.75	97.75	97,750.00
Armour & Co. Real Estate First Mortgage	4,	June 1939	1,000,000 93.25	93.25	932,500.00
Atlanta rower Co. First Mortgage	ۍ ن	Mar. 1928		100.	8,000.00
Baltimore & Ohio B R Refunding and General Mort	သ		£ 677,000 90.		609,300.00
gage	5	Dec. 1995		99.75	648.375 00
Chicago & Alton R. R. Refunding Mortgage	က	Oct. 1949	551,000 65.	65.	358,150.00
Chicago & Alton Ry., First Lien	$3\frac{1}{2}$			53.	452,620.00
Chicago City & Connecting Railways Collateral Trust	īO.	Jan. 1927	_	85.	1,109,250.00
onicago & Eastern Illinois K.K. Keiunding and Im-	•			ę	00000
Chicago, Milwaukee & St. Paul Ry. General Mortrage	۲	July 1900	900,000 09.		189,000.00
Series "A"	4	May 1989	30,000 97.	97.	29,100.00
Conicago, Milwaukee & St. Paul Ry. General Mortgage	;				
Chicago, Milwaukee & St. Paul Ry. Debenture	42	May 1989 July 1934		500,000 103. 450,000 88.2838	515,000.00 $397,277.50$
			`		

455,312.50 47,500.00	81,600.00 485,000.00	65,700.00	587,250.00 475,000.00	472,825.00	795,742.30	1,695,000.00	2,777,082.75 100,000.00	805,620.00 1,539,160.00 1,809.000.00	1,113,000.00 144,812.50 250,000.00	
500,000 91.0625 50,000 95.	102. 97.	.06	83.893 95.		1,065,000 74.7175	96.8571	97.5 100.	87. 92. 100.	84. 82.75 100.	
	80,000 102. 500,000 97.	73,000 90.	500,000	2,000,000				1,673,000 87 1,673,000 92 1,809,0001000		
Jan. 2014 Aug. 15 '26	$\frac{1933}{1927}$	1990	1993	1934	1953 1955	1966	1941	1997 1931 1937	1936 2000 1947	
Jan. Aug.	May Feb.	Nov.	June Apr.	Aug.	Apr.	Jan.	Oct. July	June May Jan.	Jan. Dec. Nov.	
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Chicago, Milwaukee & St. Paul Ry. General and Refunding Mortgage Series "A". Chicago & North Western Ry. Extension.	Chicago & Motor Western rry, Smanng Fund Deber- ture. Chicago Railways Co. First Mortgage.	Cleveland, Cincinnaci, Cincago & St. Louis 1xy., St., Louis Division Collateral Trust	eral Cleveland Short Line First Mortgage	Colorado Industrial Co. First Mortgage	Erie R.R. General Mortgage Convertible Filty-year Series "B." Illinois Central R. R. Refinding Mortsage	Interborough Rapid Transit Co. First Mortgage	International Mercantile Marine Co. First and Collar- eral Trust Sinking Fund	Lake Shore & Michigan Southern Ry. First Mortgage Lake Shore & Michigan Southern Ry. Debenture Magnolia Petroleum Co. First Mortgage.	Missouri, Kansas & Texas Ry. General Mortgage Sinking Fund. Morris & Essex R.R. First and Refunding Mortgage. Mutual Fuel Gas Co. First Mortgage.	

EXHIBIT Q—Continued

BOOK VALUE		\$29,500.00 663.75 663.75	75,600.00	249,579.00	33,250.00	1,133,610.00	94,500.00 $478,453.65$	357,150.00	11,880.00	1,473,750.00	515,000.00	
AMOUNT PER CENT		59. 59.		99.009	95.40	87.	94.5 95.69073	91.577	.66	98.25	103.	
AMOUNT		\$50,000 1,125 1,125	180,000				500,000	ຕວ	£2,400	1965 \$1,500,000	500,000 103.	
DATE OF MATURITY		ly 1957 n. 1917	Oct. 1935	3			Mar. 1904 Aug. 1953	•		June 1965	Aug. 1963	
		July Jan.	00.5	2 5	0	Ž	Yn Yn	Jul	May	n —	Au	
INTEREST RATE PER CENT	,	43	57	18 18	t 4	4,	1, 4, 4.√0	$4\frac{1}{2}$	4.	4	42	
NAME	National Railways of Mexico. Prior Lien Fifty-year Sinking Fund with January 1915 and subsequent	coupons attached. Secured 6% Notes for coupon due January 1, 1914. Guaranty Trust Co. Receipt for July 1, 1914 coupon	New Orleans, Texas & Mexico Ry. Non-Cumulative Income Series (**A**). Non-Conf. Control Time Control of 1112	New York Central & Hudson River R.R. Thirty-year Debature	New York, Chicago & St. Louis R.R. First Mortgage	New York, Chicago & St. Louis R.R. Debenture	New York Connecting R.R. First Mortgage.	Northern Facilic Ry. Refunding and Improvement Mortgage	Pennsylvania R.R. Consolidated Mortgage Sterling.	Fennsylvania R.R. General Mortgage Pittsburg. Gineinnati. Chicago & St. Louis Ry. Con-	solidated Mortgage Series "I".	

Reading Co.—Philadelphia & Reading Coal & Iron Co.						
General Mortgage	4	Jan. 1997	1997	200,000	94.25	471.250.00
runalid K.K. First Consolidated Mortgage.	46	July	1941	25,000	90.	22,500.00
St. Louis-San Francisco Ky. Prior Lien Series "A"	4	July	1950	1,500,000	72.75	1.091,250.00
See Louis-Dan Francisco Ry. Adjustment Mortgage	9	July	1955	500,000	81.975	409,875.00
Scatharn Doctor D. D. Brief and J. S. T. Contholing	ۍ. 	$\overset{\circ}{\mathrm{O}}$ et.	1949	455,000		350,350.00
Trited States First and Kelunding Mortgage.	4	Jan.	1955	100,000		
United States Fourth Liberty	44	Oct. 1	38	1,075,000		_
Without Drawes Second Liberty Converted	44	Nov. 1	5 '42	2,100,000	93.00921	1,953,193,40
Wabash K.K. Second Mortgage	2	Feb.	1939	120,000	8.76	117,360.00
Washington Ity. & Electric Co. Consolidated Mortgage	4	Dec.	1951	450,000	83.5	375,750,00
Western Maryland R.R. First Mortgage	4	Oct.	1952	1,032,000	78.8913	814,158.76
Mortgage.	ıc	0.04	1096	140 000 100	100	140,000,00
Wheeling & Lake Eric R.R. Equipment Trust Series	•	•	1350	140,000	.001	140,000.00
"B"	2	Apr.'25	2-,27	300.000	99.75	299.250 00
Wilson Kealty Co. First Mortgage	9	July 1929	1929	7,500 95.	95.	7,125.00
Total Bonds						0.00
	<u>. </u>	:	:	:	:	\$53,105,019.7Z

EXHIBIT Q—Continued STOCKS

NAME	1921 Dividend Rate Per Cent	Number of Shares	Price Per Share	BOOK VALUE
American Ship Building Co. Preferred. American Ship Building Co. Common. Anglo-American Oil Co., Ltd. (Par £1) Atchison, Topeka & Santa Fe Ry. Preferred. Atchison, Topeka & Santa Fe Ry. Preferred. Atchison, Topeka & Santa Fe Ry. Common. Banne-Scrymser Co. Capital. The Buckeye Pipe Line Co. Capital. Chentral National Bank, Savings & Trust Co. Capital. Chesbrough Manufacturing Co., Consolidated, Capital. Chicago City & Connecting Rys. Participation Certificates Preferred. Chicago City & Connecting Rys. Participation Certificates Common. Inon. Cleveland Arcade Co. Capital. Cleveland Trust Co. Capital. Cleveland Trust Co. Capital. Cleveland Continental Oil Co. Capital. Consolidated Gas Co. of N. Y. Capital. The Continental Oil Co. Capital.	7 10 20 20 20 20 20 20 20 20 20 20 20 20 20	9,303 14,957 366,517 5,000 21,100 21,100 22,070 2,070 17,530 10,518 2,000 20,000 20,000	\$85. 35. 30.50 98.25 98.25 95.2563 295. 160. 177.8538 39.8745 220.4522 69.1875 30. 98.6222 234.904 54.	\$790,755.00 523,495.00 11,178,768.50 491,250.00 2,009,908.33 42,480.00 7,950,880.00 168,961.10 8,772.40 456,336.14 1,212,856.88 315,540.00 246,555.56 89,498.77 378,000.00 1,279,182.61

The Crescent Pipe Line Co. (Par \$50)	. 9	14 190	80	000 000 110
Cumberland Pipe Line Co. Capital	2	9,000	01.	841,200.00
Harto B. D. Winet Dueformed	77	0,000	81.555	244,000.00
Exist in the first of the control of		21,400	45.8306	980,773,76
Edieka Fipe Line Co. Capital	10	12,357	361.3331	4 464 995 59
Galena Signal Oil Co. Preferred	∞	4,193	139.70	585,779,50
Galena Signal Oil Co. Common		20,000	189 7031	3 704 050 50
	1	1,597	1982 28	198,000.00
	• M	1,000	100.1001	155,500.05
Indiana Pina Co (Dow & Co)	3 5	1,200	12.	14,400.00
Konner of the Co. (1 at \$00)	9	24,845	125.111	3,108,385.28
Transwing & Hocking Coal & Coke Co. Preterred	7	$202\frac{1}{2}$	100.	20,250.00
Manawha & Hocking Coal & Coke Co. Common		1899	90.953	60,779.97
Mannattan Ity. Capital	_	10.000	128, 775	1 287 750 00
Missouri Pacific R.R. Voting Trust Certificates for Convertible)	20.00.60
Preferred		21.980	55.50	1 219 890 00
National Lead Co. Preferred	7	1,100	104	114 400
National Lead Co. Common	. 4	10,000		
National Transit Co (Day 819 go)	> 8	000,000	00.	2000,000
Now Vorly China & Gt 1 Control of the Control of th	22	120,481		ა გ
New York, Cilicago & St. Louis R.R. Second Preferred	2	400		
New Tork, Chicago & M. Louis R.R. Common.	ž,	100		
INEW I OFK Transit Co. Capital.	16	12,392		
	7	200		
Northern Pipe Line Co. Capital.	10	0000		
Fere Marquette Iky. Preferred		5,740.8		
Frovident Loan Certificates (Par \$5,000)	9	40		
Seaboard Air Line Ry. Preferred		4,300	54.	
Seaboard Air Line Ity. Common		3,400	21.	71,400.00
Price Calle Barms Co. Incorporated Preferred	9	150	99.40	
Southern Ding I in Co. Capital	0	4,538	185.007	
South West Pennsylvania Ding Lines Conital	00°	24,845	229.5556	rů,
comment of the prince of the contract of the c	0	8,000	160.	1,280,000.00

EXHIBIT Q-Continued

NAME	1921 Dividend Rate Per Cent	NUMBER OF SHARES	Price Per Share	Воок Value
Standard Oil Co. (Indiana) Capital (Par \$25) The Standard Oil Co. (Kansas) Capital Standard Oil Co. (Kentucky) Capital Standard Oil Co. (Nebraska) Capital Standard Oil Co. (New Jersey) Non-voting Cumulative Preferred ferred Standard Oil Co. (New Jersey) (Par \$25) Common The Standard Oil Co. (Ohio) Common The Standard Oil Co. (Ohio) Non-voting Cumulative Preferred Tilden Iron Mining Co. Capital Union Tank Car Co. Capital Union Tank Car Co. Capital Washington Oil Co. (Capital (Par \$10) Western Maryland Ry. Second Preferred Western Pacific R.R. Corporation Preferred Western Pacific R.R. Corporation Common Wilson Realty Co. Capital	542 122 100 100 100 100 100 100 100 100 10	$^{297,180}_{4,914}$ $^{14,726}_{7,446}$ $^{55,000}_{193,100}$ $^{16,956}_{17,088}$ $^{17,88}_{1,780}$ $^{24,000}_{15,000}$ $^{35,000}_{1774}$ $^{1774}_{1774}$ $^{1774}_{1774}$ $^{1774}_{1774}$ $^{20,195}_{20,195}$ $^{30,292\frac{1}{2}}_{300}$	\$86.70 275.016 70.2547 90. 102.8729 182.375 204. 106. 27.35 66.9203 67. 30. 46. 43.50 115.25	\$25,765,506.00 1,351,433.05 1,034,570.71 670,140.00 5,658,008.48 35,216,612.50 3,459,024.00 1,811,328.00 48,683.46 1,806,087.97 2,345,000.00 23,000.00 878,482.50 461,960.62 59,100.00 7,500.00
TOTAL STOCKS				\$144,589,212.21

SUMMARY

	. \$33,105,619.72 . 144,589,212.21	. \$177,694,831.93	. \$171,204,624.50 3,299,674.43 3,190,533.00	. \$177,694,831.93
CONTRACTOR	Bonds. Stocks.	Total book value of investments belonging to General Funds, principal and income	The foregoing investments are apportioned as follows: General Fund General Fund Income Reserve.	TOTAL

SCHEDULE OF SECURITIES IN SPECIAL FUNDS ON DECEMBER 31, 1921 JOHN D. ROCKEFELLER FUND EXHIBIT R

BONDS

NAME	INTEREST ARATE DER CENT	Dare oi Iaruri	Амопит	PRICE PER CENT	R AMOUNT PER CENT BOOK VALUE
Canada Southern Ry. Consolidated Mortgage Series	تۍ	Oct. 1962 \$37,000 100.	\$37,000	100.	\$37,000.00
Total Bonds				:	\$37,000.00

	BONDS					
Colorado Industrial Co. First Mortgage Virginia-Carolina Chemical Co. First Mortgage	5	Aug. Dec.	1934 1923	\$50,000 80. 10,000 93.	80. 93.	\$40,000.00 9,300.00
Total Bonds			<u>:</u>			\$49,300.00

LAURA S. ROCKEFELLER FUND

HENRY STURGIS GREW MEMORIAL FUND BONDS

Nov. 15 '42 \$25,850 96.71167 \$25,000.00	\$25,000.00			\$5,500.00	\$5,500.00
96.711				94.017	:
\$25,850				\$5,85(
Nov. 15 '42		Endowment		Oct. 15 '38 \$5,850 94.01709	
44		RE LYMAN	BONDS	44	
United States Second Liberty Loan Converted	Total Bonds	ARTHUR TREODORE LYMAN ENDOWMENT	1	United States Fourth Liberty Loan	Total Bonds

February 18, 1922

Mr. John D. Rockefeller, Jr., Chairman of the Board of Trustees, The Rockefeller Foundation, New York, N. Y.

DEAR SIR:

We have examined the accounts of

THE ROCKEFELLER FOUNDATION

for the year ended December 31, 1921, and report thereon as follows:

The assets recorded on the books of account kept at the administration offices of the Foundation, were verified by actual inspection and count, or by correspondence with depositories and agents or by examination of the latest available financial reports or other data pertinent thereto. The increases or decreases during the year in the Foundation's general and special fund accounts, both principal and income, and the respective balances as of December 31, 1921, were verified by us.

We ascertained that all income receivable during the year from investments, bank deposits, etc., had been properly accounted for and that all disbursements were supported by vouchers, properly approved.

The minutes of the respective Executive Committees and of the Finance Committee were examined and we noted that all pledges and appropriations had been recorded on the books of account and that purchases, sales and conversions of assets effected during the year had been duly authorized.

We hereby certify that, in our opinion, the accompanying balance sheet, the statements of income and disbursements and of appropriations and disbursements show correctly the financial position of the Foundation at December 31, 1921, and the result of its financial activities for the year ended with that date.

Very truly yours,

Lybrand, Ross Bros. & Montgomery,

Accountants and Auditors.



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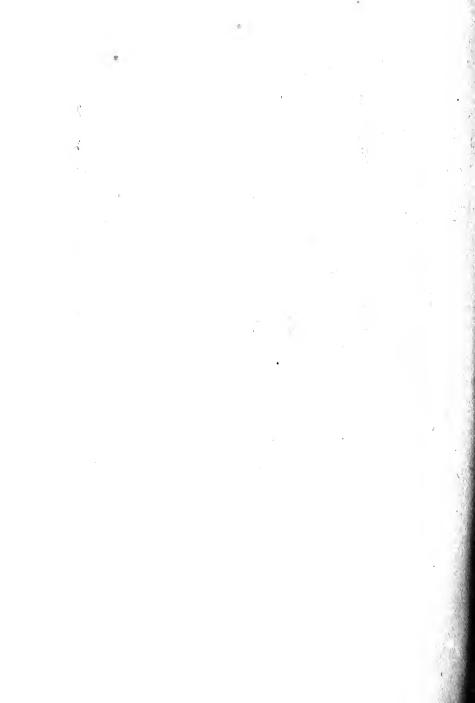
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